THE GEOGRAPHICAL REVIEW

VOLUME V

JANUARY–JUNE, 1918

PUBLISHED BY

THE AMERICAN GEOGRAPHICAL SOCIETY

BROADWAY AT 156th STREET

NEW YORK

Press of
Douglas Taylor & Co.
New York

JAN 15 1918
UNIV. OF MICH. LIBRARY

THE GEOGRAPHICAL REVIEW

PUBLISHED BY

THE AMERICAN GEOGRAPHICAL SOCIETY
OF NEW YORK

JANUARY

1918

PUBLICATIONS OF THE AMERICAN GEOGRAPHICAL SOCIETY

Books

Memorial Volume of the Transcontinental Excursion of 1912 of the American Geographical Society of New York. Edited by W. L. G. JOERG. Twenty-four papers, mostly on the geography of the United States, in English, French, German, and Italian, with an introduction and a history of the excursion. With numerous illustrations, including nearly forty portraits of European geographers. xi and 407 pp. $5.00 net.

The Andes of Southern Peru: Geographical Reconnaissance along the Seventy-Third Meridian. By ISAIAH BOWMAN. With detailed topographic maps in colors, many black-and-white drawings, and about one hundred illustrations from photographs. xi and 336 pp. $3.00 net.

The Frontiers of Language and Nationality in Europe. By LEON DOMINIAN. With 8 maps in color and 12 in black-and-white, and numerous photographs. xviii and 375 pp. $3.00 net.

Journal and Bulletin of the American Geographical Society, Vols. 1-47, 1859-1915. Known as *Journal* from 1859 to 1886, and as *Bulletin* from 1887 to 1915 (designated *Journal*, however, on title page of bound volumes from 1887 to 1900). The volumes for the following years are available at $1.00 each: 1871, 1872, 1874, 1876, 1878-1896 inclusive, 1897, 1898-1905 inclusive, 1908-1910 inclusive, 1912, 1915. A set of the *Journal* and *Bulletin* (complete except for five volumes that lack individual numbers) may be obtained for $150.00.

Members' Book, Including the Names of the Officers and Councilors, Gold Medalists, Fellows, and Honorary and Corresponding Members of the Society, together with the Charter of Incorporation. June, 1917. Pamphlet of 63 pp.

Maps in Color (Price, 25 cents each)

Physiographic Map of the Carpathians, by EMMANUEL DE MARTONNE. Scale, 1:2,500,000 (40 miles to 1 inch). 1917.

Vegetation Areas of the United States, by FORREST SHREVE. 1:9,600,000 (150 miles to 1 inch). 1917.

Map of the Frontier Region of Northern Mexico. 1:4,300,000 (68 miles to 1 inch). 1917. Shows relief, temperature, rainfall, drainage, roads, and towns.

The Parliamentary Constituencies of the British Isles and the Results of the General Elections since 1885, by EDWARD KREHBIEL. 1:2,000,000 (31 miles to 1 inch). 1916.

Map of the Arctic Regions. Prepared in co-operation with the American Museum of Natural History. 1:6,300,000 (100 miles to 1 inch). 1912. Especially rich in names.

Map of the Catskill Mountains. 1:190,080 (3 miles to 1 inch). 1907. Generalized from the topographic sheets of the U. S. Geological Survey.

Map of Eastern Labrador, by MRS. LEONIDAS HUBBARD, JR. 1:1,584,000 (25 miles to 1 inch). 1906. Embodies original survey of the George and Nascaupee Rivers across eastern Labrador from Ungava Bay to the Atlantic.

Mercator's Map of the World, 1538. Facsimile in black-and-white, reproduced from the original in the Society's collection (only two original copies of this map are known). 1885.

AMERICAN GEOGRAPHICAL SOCIETY

OFFICERS AND COUNCILORS FOR 1918

President

JOHN GREENOUGH

Vice-Presidents

JAMES B. FORD
Term expires 1919

PAUL TUCKERMAN
Term expires 1920

ANTON A. RAVEN
Term expires 1921

Foreign Corresponding Secretary

PROFESSOR WILLIAM LIBBEY
Term expires 1921

Domestic Corresponding Secretary

ARCHIBALD D. RUSSELL
Term expires 1920

Recording Secretary

HAMILTON FISH KEAN
Term expires 1919

Treasurer

HENRY PARISH
Term expires 1919

Director and Editor

ISAIAH BOWMAN, Ph.D.

Councilors

REAR-ADM. FRENCH E. CHADWICK
ARCHER M. HUNTINGTON
LEVI HOLBROOK
CHARLES A. PEABODY
Terms expire 1919

MADISON GRANT
GRENVILLE KANE
ALLISON V. ARMOUR
PHILIP W. HENRY
ALEXANDER HAMILTON RICE, M.D.
Terms expire 1920

BANYER CLARKSON
EDWIN SWIFT BALCH
W. REDMOND CROSS
WALTER B. JAMES, M.D.
H. STUART HOTCHKISS
Terms expire 1921

Associate Editor

W. L. G. JOERG

Assistant Editors

G. M. WRIGLEY, Ph.D.
GEORGE M. McBRIDE

Contributing Editors

ALBERT PERRY BRIGHAM, A.M., Colgate University
WILLIAM M. DAVIS, Hon. D.Sc., Ph.D., Harvard University
WILLIAM CHURCHILL, F.R.A.I., The Carnegie Institution of Washington
EDWARD L. STEVENSON, Ph.D., Hispanic Society of America
ROBERT DeC. WARD, A.M., Harvard University
RICHARD E. DODGE, A.M., Teachers College, Columbia University
ELLSWORTH HUNTINGTON, Ph.D., Milton, Mass.
MARK JEFFERSON, A.M., State Normal College, Ypsilanti, Mich.
DOUGLAS WILSON JOHNSON, Ph.D., Columbia University

329782

OBJECTS OF THE SOCIETY

The objects of the American Geographical Society are to collect and disseminate geographical information by discussion, lectures, and publications; to establish in the chief city of the United States a place where may be obtained accurate information on every part of the globe; and to encourage such exploring expeditions as seem likely to result in valuable discoveries in geography and the related sciences.

The American Geographical Society is the oldest geographical society in the United States. When it was founded, in 1852, there were but twelve similar societies in the world. Now it exchanges publications with more than four hundred scientific associations. The Society issues a monthly magazine of unusual interest called *The Geographical Review*. It has also a large and growing library—one of the most important geographical libraries of the world; thousands of maps and charts; and a remarkable collection of atlases of the sixteenth, seventeenth, and eighteenth centuries.

Travelers, men of science, and others properly accredited are welcome at the rooms of the Society and may freely use the book and map collections.

Two gold medals have been founded by the Society, the *Cullum Geographical Medal* and the *Charles P. Daly Medal*, which are awarded from time to time to explorers, writers, and men of science who have contributed to the advance of geographical knowledge.

In addition it awards the *David Livingstone Centenary Medal*, founded by the Hispanic Society of America.

The qualifications for Fellowship are an interest in exploration and travel, in the spread of geographical knowledge, and in the advancement of science.

A Fellow is entitled to the use of the Library, Reading and Map Rooms; to admission to all lectures and exhibitions; and to the Society's current publications, which include, besides the magazine, occasional books and maps.

The annual dues are ten dollars.

FORM OF BEQUEST

*I do hereby give and bequeath to the American Geographical Society of New York*_____

TABLE OF CONTENTS

PRINCIPAL ARTICLES

NORTH AMERICA

PAGES

BROOKS, C. F. **The "Old-Fashioned" Winter of 1917-18**..... 405–414

BROWN, R. M. **Our Waterway Requirements.** (1 diagr.)..... 119–126

CAMSELL, CHARLES. **Some Interesting Geographical Problems in the Exploration of Northern Canada.** (2 photos)..... 208–215

FLAHERTY, R. J. **The Belcher Islands of Hudson Bay: Their Discovery and Exploraton.** (3 text maps, 1 insert map in color, 10 photos)..... 433–458

JENNESS, DIAMOND. **The Eskimos of Northern Alaska: A Study in the Effect of Civilization.** (1 map, 7 photos)..... 89–101

KEIR, MALCOLM. **Some Influences of the Sea Upon the Industries of New England**..... 399–404

PEATTIE, RODERICK. **The Isolation of the Lower St. Lawrence Valley.** (1 map, 8 photos)..... 102–118

ROTH, L. V. **The Growth of American Cities.** (3 diagrs.)..... 384–398

(SAVILLE, M. H., and ——). **The Guatemala Earthquake of December, 1917, and January, 1918.** (6 photos)..... 459–469

SOUTH AMERICA

COKER, R. E. **Ocean Temperatures Off the Coast of Peru.** (1 map).... 127–135

SKOTTSBERG, CARL. **The Islands of Juan Fernandez.** (1 map, 19 photos).... 362–383

TOWER, W. S. **The Pampa of Argentina.** (9 maps, 2 diagrs., 5 photos)... 293–315

EUROPE

BABCOCK, W. H. **Corvo, Our Nearest European Neighbor** [Azores]. (1 map)..... 66–72

CVIJIĆ, JOVAN. **The Geographical Distribution of the Balkan Peoples.** (1 insert map in color)..... 345–361

CVIJIĆ, JOVAN. **The Zones of Civilization of the Balkan Peninsula.** (1 insert map in color)..... 470–482

FLEURE, H. J. **The Racial History of the British People.** (2 maps)..... 216–231

KAMBAN, GODMUNDUR. **Modern Iceland.** (5 photos)..... 195–207

WOODS, H. C. **Albania and the Albanians.** (1 map, 8 photos)..... 257–273

AFRICA

BALCH, E. S. **American Explorers of Africa.** (1 insert plate, 1 autograph, 2 photos)..... 274–281

WEST, L. C. **Dongola Province of the Anglo-Egyptian Sudan.** (1 map, 11 photos)..... 22–37

WRIGLEY, G. M. **The Military Campaigns Against Germany's African Colonies.** (5 maps)..... 44–65

ASIA

CHU, CO-CHING. **Some Chinese Contributions to Meteorology.** (1 diagr.).. 136–139

HALL, H. U. **A Siberian Wilderness: Native Life on the Lower Yenisei.** (1 map, 11 photos)..... 1–21

JEFFERSON, MARK. **The Rainfall of Java.** (2 maps)..... 492–495

WATERS, H. J. **The Development of the Philippine Islands.** (5 photos)... 282–292

AUSTRALASIA AND OCEANIA

PAGES

BEST, ELSDON. **Polynesian Navigators: Their Exploration and Settlement of the Pacific.** (1 insert map and 2 photos) 169–182

SAYLES, R. W. **A Naturalistic Model of Kilauea Volcano, Hawaii.** (3 photos) 38–43

POLAR REGIONS

—— **Cook Did Not Reach the Pole, New Evidence That** 140–141

JENNESS, DIAMOND. **The Eskimos of Northern Alaska: A Study in the Effect of Civilization.** (1 map, 7 photos) 89–101

—— **MacMillan's Ellesmere Island Trip, Notes on.** (12 photos) 183–194

GENERAL

CHU, CO-CHING. **Some Chinese Contributions to Meteorology.** (1 diagr.) .. 136–139

HUNTINGTON, ELLSWORTH. **The Sun and the Weather: New Light on Their Relation** 483–491

WHITBECK, R. H. **The Influence of Geographical Environment upon Religious Beliefs** 316–324

DEPARTMENTS

Geographical Record ....73–78, 142–152, 232–245 (3 maps), 325–334, 415–422, 496–503

Geographical Publications 79–88, 153–168, 246–256, 335–344, 423–432, 504–512

Officers and Councilors of the American Geographical Society for 1918 .. iii

Objects of the Society iv

Index 513–557

Errata 558

Separate Illustrations

Map Showing the Routes of Entry and Some Recorded Voyages of the Polynesians in the Pacific Ocean, equatorial scale, 1:50,000,000. Pl. I, opp. p. 176

Facsimile of questions prepared by Stanley for his expected interview with Livingstone ..... Pl. II, opp. p. 280

Ethnographic Map of the Balkan Peninsula, by JOVAN CVIJIĆ, 1:3,000,000 Pl. III, opp. p. 358

[Map of] **The Belcher Islands,** from plans and sketches of ROBERT J. FLAHERTY, F.R.G.S., 1:1,500,000 ..... Pl. IV, opp. p. 440

[Map of the] **Zones of Civilization of the Balkan Peninsula,** by JOVAN CVIJIĆ, 1:3,000,000 ..... Pl. V, opp. p. 480

THE GEOGRAPHICAL REVIEW

CONTENTS FOR JANUARY, 1918

A Siberian Wilderness: Native Life on the Lower Yenisei. By H. U. Hall. (1 map, 11 photos) 1

Dongola Province of the Anglo-Egyptian Sudan. By Louis C. West. (1 map, 11 photos) 22

A Naturalistic Model of Kilauea Volcano, Hawaii. By Robert W. Sayles. (3 photos) 38

The Military Campaigns Against Germany's African Colonies. By G. M. Wrigley. (5 maps) 44

Corvo, Our Nearest European Neighbor. By W. H. Babcock. (1 diagr.) 66

Geographical Record 73

American Geographical Society

Monthly Meeting of December . 73

North America

War Activities of the U. S. Geological Survey 73
Forest Growth on Abandoned Farms 73
Evaporation from Snow Surfaces in Irrigated Regions . . . 74
Influence of the War on the Population Growth of Salvador 74

Europe

The Situation of the Steel Industry in Great Britain . . 74
The Population of Spain . . . 75

Africa

The Climate of German East Africa 75
The Economic Future of French North Africa 76

Asia

Japan, the Commercial Focus of the Pacific 77

Australasia and Oceania

The Settlement of Tropical Australia 77

Human Geography

The Desert Aridity of Heated Houses 77

Geographical News

Founding of the Cortes Society . 78

Geographical Publications 79

The Society is not responsible for the opinions or the statements of writers in the Review

Published monthly by the American Geographical Society
Broadway at 156th Street, New York, N. Y.

Price, fifty cents a number — Five dollars a year

Entered as second-class matter, January 22, 1916, at the Post Office at New York, N. Y. under the act of August 24, 1912

Press of Douglas Taylor & Co., New York

OUR CONTRIBUTORS

Mr. Hall is assistant curator of the Section of General Ethnology of the University of Pennsylvania Museum. In 1914–15 he represented the University Museum in an ethnological expedition to west-central Siberia under the joint auspices of that institution and Oxford University. The present article is based on observations made at that time.

Mr. West made the trip to Nubia which he here discusses in connection with the Harvard University-Boston Museum of Fine Arts expedition of 1912–14 to Egypt and the Sudan. He has written several articles on the archeology of the region, including one on "The Cost of Living in Roman Egypt" in *Classical Philology* and one on "Commercial Imports into Roman Egypt" in the *Journal of Roman Studies*.

Mr. Sayles is curator of the Geological Section of the Harvard University Museum, in which the model he describes is on exhibition. Mr. Sayles, whose specialty is seismic geology, was instrumental in the preparation of the model.

Miss Wrigley is a member of the editorial staff of this Society and author of several papers on South American geography in the *Review:* Salta, An Early Colonial Center of Argentina (August, 1916), and The Traveling Doctors of the Andes: The Callahuayas of Bolivia (September, 1917).

Mr. Babcock is a lawyer and author of Washington, D. C., who has devoted himself to the history of early cartography and geography. He is the author of "Early Norse Visits to North America" (1913), "Atlantis, or Antillia" (May, 1917, *Review*), and "Markland, Otherwise Newfoundland," October, 1917, *Review*).

ARTICLES ON THE GEOGRAPHY OF THE WAR

published in the Geographical Review

The Great Russian Retreat. By D. W. JOHNSON. (25 pp.; with 6 maps and 6 photographs.) . . . . February, 1916.

The Balkan Campaign. By D. W. JOHNSON. (21 pp.; with 1 map and 4 photographs.) . . . . . July, 1916.

The Conquest of Rumania. By D. W. JOHNSON. (19 pp.; with 1 map and 3 photographs.) . . . . . June, 1917.

In these three articles Professor Johnson discusses the influence of geographical conditions on the military campaigns in the areas affected. The second deals with the campaign against Serbia at the end of 1915. Each article gives an outline of the physical features of the area discussed and is illustrated by maps showing the positions of the battle lines at various critical junctures.

The Rôle of Political Boundaries. By D. W. JOHNSON. (5 pp.) . . . . . September, 1917.

A geographical discussion of the boundary problem, as set forth in several recent articles.

Europe at Turkey's Door. By LEON DOMINIAN. (9 pp.; with 2 maps.) . . . . . April, 1916.

Discusses the claims of the European powers to Turkish territory, based on political and economic grounds. Illustrated by a separate map showing the spheres of influence and territorial claims in Asiatic Turkey of Russia, England, France, Greece, and Italy.

Russia's War-Time Outlets to the Sea. (5 pp.; with 1 map.) . . . . . February, 1916.

Deals with the closing of the Baltic and Black Sea outlets to Russia by the war and her circumvention of this obstacle, especially by the construction of a railroad to Kola, an ice-free port on the Arctic Ocean. With map.

The Economic Resources of the Russian Empire. By E. K. REYNOLDS. (17 pp.; with 1 map and 10 photographs.) . . . . . April, 1916.

Accompanied by a map showing the distribution of the main economic resources of both European and Asiatic Russia.

Flanders. By RAOUL BLANCHARD. (17 pp.; with 2 maps and 9 photographs.) . . . . . December, 1917.

A summary of the geography, physical and human, of one of the most important battle areas of the present war.

The People of Hungary: Their Work on the Land. By B. C. WALLIS. (17 pp.; with 8 maps.) . . . . December, 1917.

A discussion of the human geography of Hungary, with special attention to the problem of nationalities. Two of the accompanying maps, representing by a new method the population density and distribution of nationalities, are especially valuable.

The Carpathians: Physiographic Features Controlling Human Geography. By EMMANUEL DE MARTONNE. (21 pp.; with 2 text-maps, 1 insert map in color, 3 diagrams, and 10 photographs.) . . . . . June, 1917.

A general account, illustrated by a colored physiographic map, of the interrelations of the physical features and human life, many of which have a bearing on the military operations of the present war in this area.

Poland: The Land and the State. By EUGENIUSZ ROMER. (20 pp.; with 12 maps.) . . . . . July, 1917.

A geographical interpretation of Poland's history and development and an exposition of her essential geographical unity. The article is accompanied by ten black-and-white maps illustrating the racial and territorial development of Poland from 800 to 1795.

Trade Movements and the War. (2 pp.) . . . March, 1916.

Our Trade in the Great War. By MARK JEFFERSON. (7 pp.; with 3 diagrams.) . . . . . June, 1917.

The first article points out various fundamental effects of the war on world trade. The second deals with the trade of the United States before our entry into the war. By grouping the statistics concerning the chief countries with which we have trade dealings into four groups, viz. the Allies, the Central Powers, the Near Neutrals, and the Far Neutrals (with respect to Germany), the various factors affecting the war trade are more clearly discerned.

Aëronautical Charts. By OMAR B. WHITAKER. (5 pp.; with 2 maps.) . . . . . July, 1917.

Aëronautical Maps and Aërial Transportation. By HENRY WOODHOUSE. (22 pp.; with 4 maps, 3 drawings, and 5 photographs.) . . . . . November, 1917.

European War Maps. By W. L. G. JOERG. (4 pp.) . . July, 1917.

The first two articles discuss a phase of mapping of high importance in the development of the aëroplane. They are illustrated by reproductions of aëronautical maps used in this country and in Europe. The second article also deals with the commercial possibilities of aëronautics in the immediate future. The third article gives a selected list of maps, detailed topographic sheets as well as general maps, of use in following the military operations in Europe.

THE
GEOGRAPHICAL REVIEW

VOL. V JANUARY, 1918 NO. 1

A SIBERIAN WILDERNESS: NATIVE LIFE ON THE LOWER YENISEI*

By H. U. HALL
University of Pennsylvania Museum

If it is true that man is to a marked degree what his surroundings have made him, it is no less true that he struggles to shape those surroundings to a form that shall coincide with his imaginings of things as he would like them to be. If he cannot by manipulation of what is tangible about him modify his environment to his taste, he is likely to set up in the realm of his imagination a place of fictitious solace in which he can find relief from circumstances which prove too hard. Nature is adamant, and even by strenuous labor and in the most favorable circumstances he can no more than scratch on the surface a fleeting picture of what face he would have her show to him. Transplant him to a region where sun and soil are less complaisant, and he will trace strange pictures in the snow and hold as articles of faith tales of heroes or saints or shamans whose virtue (that is, power to transcend the limits of human endeavor in conflict with irrevocable nature) lies in producing conditions comparable to those in which toil could produce crops and blossoms and practicable paths. Yet these very figments of his brain are the products of his surroundings. He paints on the canvas of things as they are a picture of conditions suggested as their opposite, just as the sight of an empty platter conjures up a vision of heaped viands to the eye of a hungry man. So the Tungus of the Arctic wilderness sets beside the grave of the shaman, who to him represents the acme of human, or super-human, success against the old enemy nature, or super-nature, a crude arrangement of trimmed logs to stand for the horse which he has never seen. The tribal memory has preserved through the ages this relic of the days when the reindeer, which is now his only mount, was but the quarry of the hunter. And so the Russian monks on the fringes

* Some notes concerning a year's stay in the Arctic on behalf of the University of Pennsylvania Museum. For an account of the expedition of which the author was a member see *Geogr. Rev.* for September, 1916 (Vol. 2, pp. 229–230).

Copyright, 1918, by the American Geographical Society of New York

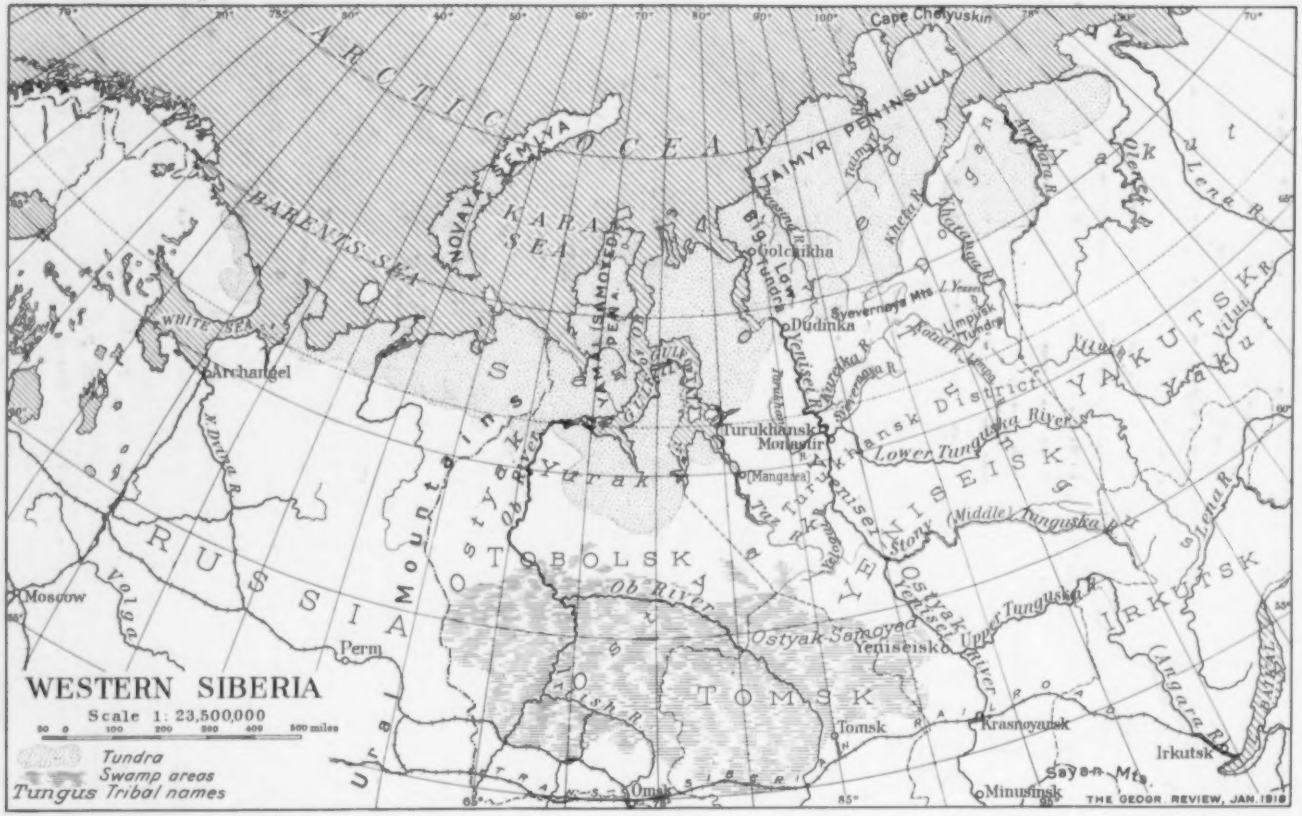

FIG. 1—Sketch map of eastern Russia and western Siberia showing the location of the geographical features and the native tribes mentioned in the text. Scale, 1:23,500,000.

of the Arctic embroider the legend of an uncanonized saint, whose body was brought by a pious brother to grace their foundation, with fantastic touches of a flowery mead in which the uncorrupted corpse lay in mid-winter and of blossoms which hedged a firm pathway through the marshes when Tichon brought the good Vasili to his shrine.

The Turukhansk District of the Yeniseisk Government of Siberia, with its sparse population of native tribes still very largely unmodified by contact with Russians, and its conditions, Arctic or sub-Arctic, little modifiable by any human means, affords an excellent field for the study of people living among surroundings as uncongenial to human life as can well be conceived—people who have adapted themselves, nevertheless, to those conditions with a contentment and cheerfulness sustained by that unquestioning faith which sees flower beds in snowdrifts and steeds fit for shamans in the frozen tundra. The comfortable balance struck between things as they are and things as they might be, or the ignorance of what things might be elsewhere, has been disturbed only by the meddlings of their civilized masters, whose profitable business it is to awaken in them desires for things they never knew they lacked and to acquaint them with the prices the civilized world pays for its luxuries and the gratification of its lusts.

Early Settlements

The Russians long ago reached at any rate the outskirts of the Turukhansk District; and, unsuitable as the region is for colonization by Europeans, small Russian settlements are scattered along the banks of the Yenisei as far as its mouth, dwindling, as the Arctic Circle is neared and passed, from groups of two or three houses to solitary log huts at great distances from one another. The merchants of Novgorod in the eleventh century sent goods by sea to the country about the mouth of the Ob and Taz and reached the same region also by making use of the system of rivers and lakes which intersects the Yamal, or Samoyed, Peninsula between 70° and 70° 20′ N. latitude.[1] The *ostrog* (stockaded post) of Mangazea on the Taz grew into a flourishing settlement between 1581 and 1762, at which latter date it was destroyed by the Yurak. For a considerable part of this time there was a busy trade route between Mangazea and the coast of the White Sea; and the Moscow merchants received valuable cargoes of furs in exchange for their shipments of tea, spirits, gunpowder, and guns to the natives. Mangazea was the first administrative and commercial capital of Siberia, after the "conquest" of Yermak put the official seal on the process of penetration, peaceful and otherwise, which had long been going on. In 1610 was founded Turukhansk on the Turukhan River, which flows into the Yenisei from the northwest some distance north of the 65th parallel. Turukhansk was for a long time the administrative center of the Turukhansk

[1] See B. M. Shitkow: Die Erforschung der Samojedenhalbinsel (Jamal), with map, 1:1,750,000, *Petermanns Mitt.*, Vol. 57, Part II, 1911, pp. 11-14, 67-71.—Edit. Note.

District; but in 1909 this distinction passed from it to the village of Monastir on the opposite bank of the Yenisei, where it is joined by its great right tributary the Lower Tunguska. Locally this latter settlement is still known as Monastir, though its official designation, in spite of the crumbling survival of the other group of log huts, is now Turukhansk. It received the name Monastir from a monastery, still in existence, founded at this spot in the middle of the seventeenth century.

In the sixteenth century English merchants trading with Archangel, in the course of attempts to discover a Northeast Passage to the Indies, reached the Ob. By the end of that century Dutch mariners were rivaling the English in the White Sea trade and the search for a Northeast Passage, although handicapped in the competition through the granting to English traders by the Moscow government of special privileges denied even to Russians.

The Russians apparently became suspicious of this active movement of foreigners towards the inhospitable coasts of their new possession and decided to keep the trade with Siberia exclusively in their own hands. The Moscow government began to build sea-going ships for the transport of goods between Archangel and Mangazea. At this time—the first quarter of the seventeenth century—colonization of tundra and *taiga* was much more extensive than at present. Mangazea, Turukhansk, and Yeniseisk became important settlements. Finally, in 1620, the sea route, closed to foreigners in 1616, was barred even to private Russian traders, and communications with Mangazea were kept up only for the benefit of the administration, which continued to receive abundant *yassak* (tribute from natives) and large quantities of valuable furs, reckoned the perquisite of the government. The result was that colonization languished. Mangazea, long before its destruction in 1762 by the Yurak, was almost deserted. What traffic there was, was kept up by the land route across the Yamal Peninsula. Not a keel furrowed the Kara Sea for 250 years.

The Kara Sea Route

In 1859 a rich Siberian merchant, by the name of Sidoroff, conceived the idea of reopening the Kara Sea route, which is practicable for a few weeks during the summer. It took him fifteen years to accomplish his purpose; and in 1874, Captain Wiggins, an English sailor, working in co-operation with Sidoroff, brought his steamer into the Yenisei. Next year Nordenskiöld, in the *Vega*, reached the mouth of the river. In 1876, for the first time, European (English) goods reached Yeniseisk by steamer direct from Europe. In the ten years from 1877 to 1887 thirty-four steamers attempted the passage, but only fourteen with success. Between 1887 and 1898, English traders having been given the privilege of using this route without paying duty on goods brought by it, more money was invested, and a greater degree of success was attained. During these eleven years, thirty-

FIG. 2—A Yenisei-Ostyak in the outskirts of the *taiga*, or northern forest, near Monastir-Turukhansk, 50 miles south of the Arctic Circle. The Yenisei-Ostyak bow is the type of the compound bows used throughout the Turukhansk District. The making of bows for their neighbors is still an industry of the Yenisei-Ostyak. (All photos, except Figs. 4, 9, and 10 from the University of Pennsylvania Museum.)

six vessels made the voyage, and cargoes averaging about 1,000 tons a year, consisting chiefly of mining and agricultural machinery, reached Siberia by this route.

This trade did not a little to develop civilizing influences in Siberia; but in 1898 restrictions on imports were re-imposed, and, as a consequence, not a single foreign vessel passed through the Kara Sea to Siberia for six years. In 1905 duties were again removed, and twenty-two vessels came to the northern coast of Siberia. The vacillating policy of the Russian government in the matter of these imposts manifested itself more than once in the following years, with the result of discouraging enterprise. Some two years before the war, however, a company was formed with directors in London, Christiania, and Petrograd for the purpose of promoting trade with central Siberia via the Kara Sea and the Yenisei, and what promised to be regular traffic between Krasnoyarsk and western European ports had been established.[2]

The Turukhansk District

The Turukhansk District forms the northern portion of the Yeniseisk Government, the administrative division of Siberia which includes the west-central part of the colony (map, Fig. 1). Its northern extremity, Cape Chelyuskin in the Taimyr Peninsula, is the nearest point of the Eurasian mainland to the Pole. It includes the greater part of the basin of the lower Yenisei, from the Stony (Middle) Tunguska to the Arctic Ocean, and marches with the outer limits of the Ob and Lena basins on its western and eastern borders respectively. It is officially stated to comprise an area of 1,616,734 square versts (about 718,500 square miles). Its surface is intersected by a large number of streams, many of considerable size, of which the chief, apart from the great main stream of the Yenisei itself, are the right tributaries of the Yenisei, the Middle and Lower Tunguska, and the Kurëika; its left tributaries the Kas, the Yelogui, and the Turukhan; flowing north, to the west of the Yenisei, the Taz; flowing north, to the east of the Yenisei, the Pyasina, the Taimyr, the Kheta-Kotui-Khatanga, and the Anabara; flowing southwest and south, respectively, into the Lower Tunguska, the Syevernaya and the Limpa. These, with their tributaries small and large, make of the region east of the Yenisei particularly, except for a large portion of the rugged Taimyr Peninsula, a veritable network of waterways, the highways of the nomadic inhabitants. For the snow-covered ice of the rivers and lakes is not only a guide for direction through an otherwise trackless wilderness but affords easy going for the reindeer. The lower Kotui to its junction with the Khatanga drains a region abounding in small lakes, forming a chain with Lake Yessei at its northeastern extremity. This lake is one of the landmarks of the somewhat indefinite boundary line

[2] See the note in *Geogr. Rev.* for February, 1917 (Vol. 3, pp. 151-152), and the references contained therein.—Edit. Note.

between Yakut and Tungus territory. The Tungus hereabouts are called by the Russians Limpiisk Tungus and their land the Limpiisk Tundra, from the Limpa River.

The country to the east of the Yenisei is rugged, with elevations which in some places deserve the name of mountains. Even the so-called Big Low Tundra between the Pyasina and the estuary is for the most part a rolling moorland at an appreciable elevation above sea level. West of the river, and especially in the basin of the Taz, the land lies quite low. The extensive highlands between the headwaters of the Pyasina and the lacustrine region are usually known as the Syevernaya (Northern) Mountains.

FIG. 3—Yenisei-Ostyak fishing encampment on the Yenisei near Turukhansk.

The whole region is thus situated within the great lowland comprising that part of Siberia which lies between the Caspian and Aral basins and the lower Lena. The lowest portion of this, within Siberia proper, is the great marshland on the lower Irtish and middle and lower Ob, extending northeastward to the valley of the Taz. East of the Yenisei this region can only be characterized as a lowland by comparison with the great mountain-masses which form an almost unbroken chain, stretching in a great curve with a generally northeastwardly trend from Afghanistan to Bering Strait. The eastern portion of the Turukhansk District is an extensive plateau crossed by rugged chains of hills whose summits are from 500 to 1,500 feet above sea level. This is the rock- and lichen-tundra of Middendorff.[3] In the valleys of the numerous streams strips of forest extend quite far north, dwindling in extent and in the size and height of the trees from a fairly normal growth and variety—larch and birch and pine—on the Lower Tunguska, to the straggling, stunted, almost limbless larches of the upper Khatanga and Kotui. About the estuary of the Yenisei the only wood is

[3] A. T. von Middendorff: Sibirische Reise, 4 vols. and atlas. St. Petersburg, 1848-75.

driftwood—there is abundance of that brought down from the *taiga*, or forest region, far to the south; and the tundra here is lower, though by no means an undiversified level—Middendorff's moss, or *Polytrichum*, tundra.

Climate

One might almost say that there are only two seasons in the northern Siberian year. In May the temperature rises abruptly; it falls with almost as great suddenness in September. At Golchikha, at the head of the estuary of the Yenisei, in 71° 45′ N., the sun for more than two of the three summer months is above the horizon. The change from winter to summer conditions is accomplished almost at a bound. In the middle of June the

Fig. 4—Skyline in the tundra near Golchikha. Reindeer of a Dolgan herd. (Photo from M. A. Czaplicka, Oxford.)

flats at the confluence of the little Golchikha with the Yenisei are still covered with snow, which also fills the gorges in the flanks of the low hills edging the tundra behind. It is the most desolate picture that can be imagined. The sun shines pallidly through the gray mist, which fails to conceal the brown crumbling hillsides that for nine long months have been mercifully hidden under a decent shroud of snow. The silence, broken only by the raucous tones of hovering gulls, is well suited to the place. One seems to have come upon an earth grown old and mouldered, dead beyond hope of awaking. In a few days you will be walking along those hillsides ankle-deep in flowers purple, blue, and gold, or wading across the flats from mound to mound of veritable garden-beds.

The Tundra

On the banks of the river one does not speak of being in the tundra. This is a highway which connects the settler or transient voyager with a living world; to the nomad of the tundra, it is only a place to which one comes with nets to get supplies for the winter larder or to pay in labor some part of the debt which the trader will never wholly write off. To this class of sojourners upon the river the waste of waters in the great stream—six miles wide, a little below—shows no friendly, familiar face. When the

time to strike his tent comes he does not say, it is true, "I am going home," but "I am going to the tundra," which is, in effect, the same thing. Then he packs his tent and so much of his catch as the traders have left him, and his scanty household goods, upon two or three or half a dozen sledges, and, since snow has not yet fallen or at any rate is not yet deep, harnesses four or five reindeer to a sledge, instead of the winter team of two, and is whisked off over the low hills to the wide spaces where he can call his soul and his time his own.

The going is not hard. Even on the hilltops the earth is soft enough usually, and, where on the wide stretches of plain it is too soft for walking to be anything but a labor for humans, the light, broad-footed deer splash along at a quite respectable pace. The surface is a series of terraces, so to speak, at a higher or lower level, separated by low hills, or diversified by areas of uneven ground, a confusion of shallow valleys and rounded hillocks. Each terrace is at first to all appearances flat; but it grows marshier as you advance, and it soon becomes evident that you are in a sort of shallow basin, the rim of which forms the horizon on every side, shutting off the view of hills beyond. It is in a spot such as this that the illimitableness and monotony of the tundra come home to you. It is only on exposed hillsides or banks, on which the sun's rays fall almost perpendicularly, creating oases of warmth in the ice-chilled barrenness of the soil—for everywhere there is eternal ice from eighteen to thirty-six inches beneath the surface—that the bright blooms are spread to relieve the eye. Here there is nothing but the tussocks of brownish sour-grass and sphagnum moss and the dirty reddish brown water that can neither run off nor become absorbed in the thin layer of unfrozen mud. "No variety, no shadow, no night. Everywhere . . . . . calm and silence. The whole summer through, the one long endless summer day broods over the far northern tundra, its light the pale gleam of a moonlike star veiled in mist."

Ground like this affords, of course, no substantial sustenance for man. Along the river from Yenisëisk as far north as old Turukhansk some of the more enterprising spirits among the settlers do succeed in raising scanty crops. Turnips, radishes, and cabbages can be coaxed into growing even near Turukhansk. Aside from the severity of the climate, the swampy character of the ground on the left side of the Yenisei and the stony barrenness of the right bank have to be reckoned with. As for the natives in their forests and heaths and moss pastures, they do not even make such use as they might of the limited resources that unassisted nature offers in this respect. The women and children gather, in a somewhat casual way, the cranberries and huckleberries which are fairly numerous in some parts of the region. These are eaten raw with milk—a royal treat, for the fawns take most of the scanty yield, and milk is very sparingly used for any human purpose. Or the berries are dried and mixed with "Tungus bread," the smoke-dried and pounded flesh of reindeer or of moose. Bark and roots

FIG. 5.

FIG. 6.

FIG. 5—Reindeer teams swimming a stream in the Big Low Tundra near the Arctic Coast. They are being towed by a man in a boat, not seen in the picture.

FIG. 6—Summer sledging in the tundra near Golchikha. The soft carpet of the moss tundra affords almost as good a surface in summer for sledging as does its snow cover in winter.

The man is a Samoyed. The long stick is the *horrei*, or goad. It is used not only to urge on the deer, but as an aid in guiding the team, which is controlled otherwise only by a single long rein attached to the headstall of the leader.

FIG. 7.

FIG. 8.

FIG. 7—Tungus boys: a summer *irgish* (trek). The weapon is the *arkas* or *yalma*, used in clearing brushwood or blazing a trail in the forest. It is the old Tungus spear or halberd and is the only weapon with which the Tungus hunter will face a bear.

FIG. 8—Tungus pack train in the Limpiisk Tundra—the country between the Yenisei (north of the Lower Tunguska) and Lake Yessei. This is the home of the Limpiisk Tungus, an important group of the people of that stock who are found within the Yeniseisk Government.

are only eaten as a last resource, when the spring or autumn hunting has failed and famine threatens the owners of small herds of reindeer.

Arctic Hysteria

It has been observed by Schimper[4] that the two most salient characteristics of the polar climate are temperature and illumination—the one as manifested in the long cold winter and the short cool summer, the other in the long winter night and the short summer day. His statement refers to the effects of the phenomena on the plant life of the Arctic. But there can be little question of the profound influence of these abnormal conditions, not merely on the physical but also on the mental constitution of people long subjected to them. Especially would this seem to be true of the periods of continuous daylight and of dark. Apart from the necessity of making the most of the long day, when it comes, for necessary tasks and thus shortening the hours of rest, there seems to be a kind of stimulation of the nervous system which urges one to a feverish and purposeless kind of activity. Russian settlers, especially newcomers, are more obviously affected in this way, but it is clearly perceptible also among the natives. The coming of the long, brooding winter night is followed by a kind of reaction, the effects of which are not always so obvious. There is no general depression of vitality apparent. Among the natives the dark midwinter with the necessary cessation of most kinds of activity is the special period for the making and returning of visits to distant friends and relatives; the tents are veritable hives of cheerful conversation and chaff. But none the less this is the time when the so-called "Arctic hysteria" is apt to show itself under circumstances tending to favor a lapse of self-control. This is the time when you are likely any night to be startled out of your sleep by the sudden bursting into song, plaintive and weird, of a sleeping Tungus tent-fellow. This will continue indefinitely if he is not awakened, and he will have then no recollection of his dream song. The Limpiisk Tungus do not recognize singing in one's sleep as a sign of mental disorder, as they do some of the other forms of "Arctic hysteria"—classified by M. A. Czaplicka in "Aboriginal Siberia."[5] Such, for instance, is a form of hysterical seizure, for which they have a special name, in which the patient sings improvisations of his own which are likely to contain absurd exaggerations or laughable glorifications of himself. The last instance remembered in the Limpiisk Tundra was when there was an epidemic of this kind about ten years ago, following a famine, in which one of these megalomaniacs was killed by three fellow-tribesmen, themselves also apparently affected by the disorder, who resented his frenetic boastings, in which he represented himself as a god. The natives of northern Siberia, and especially those of more recent immigration, seem to be peculiarly susceptible to these expres-

[4] A. F. W. Schimper: Pflanzen-Geographie auf physiologischer Grundlage, Jena, 1898, p. 698.
[5] Oxford, 1914 (reviewed in *Geogr. Rev.*, Vol. 1, 1916, p. 161).

sions of emotional instability. Typical cases are rare among Europeans. It would seem that the older inhabitants of the region have had time to adapt themselves mentally, so that the abnormalities or extremes of the environment have become normal to them, while the Russians have not been subject to a sufficiently long accumulation of the peculiar influences to be so profoundly affected.

Reindeer Herds

All the tribes are reindeer nomads. The Samoyed (Ostyak-Samoyed and Yurak) of the north are the oldest western exponents of this culture, as they are the oldest of the present inhabitants of the extreme north from the Taimyr Peninsula to Russian Lapland. The Dolgan, Yakutized Tungus, have thrust themselves northwestward into Samoyed territory near the right bank of the Yenisei, from the lacustrine country where the Yakut, pressing westward from the Vilui basin, are still crowding the Limpiisk Tungus on their eastward border. The Dolgan show their relatively late adoption of reindeer culture by the smallness of their herds and their habit of riding their reindeer, even where they are in closest contact with the Samoyed, who have not even a word for saddle and refer to the Dolgan double cushion somewhat sneeringly as "the sledge on the back."

It cannot, of course, be said that the domestication of reindeer is a necessary condition of survival in the Arctic, since, even in northern Siberia, there are tribes, or parts of tribes, which have no herds and manage without them apparently as well as the people of Arctic America. But it does seem at least that the maintenance of this culture, once adopted, is necessary to the survival of a group. It is the ravages of anthrax among their herds, at least as much as the evil influences of a closer contact with Russians than has fallen to the lot of the other tribes of the Turukhansk District, that is accountable for the degeneration and approaching extinction of the so-called Yenisei-Ostyak. It is the impoverished Samoyed, i. e. the man whose herd has so dwindled in numbers that it has become necessary for him to make the pursuit of fishing his chief employment, who, through the necessity of keeping close to the river, has fallen into the hands of the traders and sunk into peonage and alcoholism. Among the Limpiisk Tungus even, who are, except the Yakut and the Russians, the latest arrivals in the Arctic, the prime test of a man's social standing is the size of his herd. Very few of them have herds that will compare in numbers with the five or ten thousand deer of a wealthy Yurak. But a man whose not very remote forebears had no more than, say, ten or twenty deer and who was held in esteem principally for his prowess in hunting, if his herd does not considerably surpass the ancestral figure, is now spoken of with some accent of disparagement as a "fisherman": he is forced, that is, to keep ice holes open in river or lake throughout the winter in order that he may keep his larder supplied with the aid of gorge and lure. The larger the herd, the more draught or riding

animals are available and the more mobile, therefore, is the hunter; he can thus follow game far afield in a bad season and lay up for the dark mid-winter, when hunting is impossible, a good store of meat. In a society where the hardships of the struggle for existence are unmitigated by poor-laws, there is not much between the weakest and the wall.

Clothing

As the Samoyed (including the Yurak) have been longer in the Arctic than any of the other existing populations, except the vanishing Yenisei-Ostyak, it might be expected that the peculiar conditions would have left a deeper impress on their mental life than they have on that of their neighbors; and indeed much evidence in support of this conclusion might be adduced. So far as the more obvious aspects of the outer life of all these peoples is concerned, they are, broadly, very similar, in correspondence with the sameness of conditions throughout the Polar regions. The necessity for protection against the extreme cold—away from the coast and in the highland valleys, which act, so to speak, as accumulators of cold air, over 100 degrees of frost being not unusual—has led to the contrivance of a sort of clothing which is extraordinarily well-suited to its purpose. The doubling of outer garments, coats and boots, usually of reindeer pelts, provides an insulating air space which keeps the cold out. Differences in the arrangement and decoration of these garments correspond to the tribe to which the wearer belongs. The Samoyed wears the inner of the two coats with the hairy side turned in, that of the outer, outwards; the Tungus vice versa, or the latter's hooded outer coat may be of hide without the hair.

Methods of Travel

The sledge is another feature common to all these Arctic cultures. The type throughout this region is the light Samoyed sledge with high upcurving runners and a platform raised from two and a half to three feet above the ground. This is used both summer and winter by the Samoyed. Its use in summer would be impossible in the rugged, partially forested country of the Limpiisk Tungus. The use of sledges by the latter is indeed a recent innovation, which they say came in by borrowing from the Samoyed only three or four generations ago. Many Tungus still practice, even in winter, the "old-time *irgish*"—the pack-train of reindeer led by a mounted woman when moving camp. The old and the new mingle here; as likely as not the man precedes the column, traveling light in an unladen sledge. Snow-shoes are wooden, upturned in front, approximating the type of the ski, though much shorter and wider. The best are shod with reindeer skin.

Traveling in the Limpiisk Tundra is not so comfortable as it is farther north. There is a route to near Lake Yessei from Dudinka by which the Russian traders travel in great luxury. Their vehicle is the *balok*, a box-like canvas-covered fur-lined contrivance on runners, drawn by six or eight

FIG. 9.

FIG. 10.

FIG. 9—Lake Uchun, a mineral water lake in southern Siberia, south of Krasnoyarsk. Frequented as a *kur* by the Russian population. (Photo from M. A. Czaplicka, Oxford.)

FIG. 10—On the Yenisei between Krasnoyarsk and Minusinsk in the southern part of the Yeniseisk Government. This is the sort of country in which the ancestral stock of the Samoyed led the wandering life of hunters, before they were driven northward to face the still more rigorous conditions of the tundra. (Photo from M. A. Czaplicka, Oxford.)

deer. It carries a stove and can be made quite comfortable, no doubt, for one who is accustomed, as the trader is, to super-heated stuffy rooms. This route, too, is the one almost invariably used by these people and by officials, and along a part of its length there is a nondescript half-caste, more or less sedentary population, the offspring of exiles, criminal and other, and of the traders. Anyone who wishes to know the uncontaminated native will eschew the "comforts" of the northern route. The rocky tablelands and partly forested valleys of the Turukhansk-Yessei route are impassable to the heavy *balok*, and the light native sledge is the only satisfactory vehicle. So the Limpiisk people are comparatively free from undesirable visitors.

One keeps to the river valleys as much as possible. Here the snow is fairly deep, and the smooth motion of the sledge is liable to interruption only through a few trifling circumstances, such as the not infrequent tendency of a pair of deer to choose each its own side of a tree to pass on, with the resulting entanglement of antlers, traces, and other gear. Or you may come to a bit of treacherous ice underlain by rapids in the bed of the stream on whose frozen surface you are traveling, and run the risk of getting your feet wet—a serious matter in temperatures which have to be measured by spirit thermometers. But the valley trails are cushioned ease compared with the going on the stretches of bare rock-tundra plateau which often have to be crossed. The precipitation of snow in this country is small, and the fierce winds which sweep the bleak highlands do not let much of it lie. Your sledge progresses in a series of leaps and bounds from one miniature boulder to another, and you spend your hours in a sort of dull aching wonder as to which will go to pieces first, your own racked skeletal framework or that of your sledge. Where a number of people travel in company the usual procedure is to rope several sledges, each with its team of two reindeer, together, while the man who knows the country best acts as driver of the train. In going down the precipitous slopes which form the approaches to the plateaus no one thinks of getting off his sledge. You go from top to bottom in a series of breathless rushes, checked only by a projecting ledge or boulder which brings you up with a round turn, the runners of your sledge on top of the sledge in front, your team of reindeer fairly underneath you, or at luckiest, sprawled kicking and panting with terror on each side. Fortunately the traces are long, and the sledges light, or the teams of a train would be practically exterminated whenever such an escarpment has to be descended.

Dwellings

The necessities of a wandering life require a light, portable dwelling. The *chum*, or tepee, is essentially the same throughout: of reindeer skin, usually, though the Yenisei-Ostyak make their summer tent cover of birch bark. The *golomo*, or conical tent-shaped log hut of the Limpiisk Tundra, is a mere translation of the skin tent into logs. *Golomos*, or, more rarely,

rectangular *balagans* copied from the Russian settlers' shacks on the river, are occupied during two or three months of the winter by some of the wealthier Tungus and Yakut of the forest border. The *golomo* may have sometimes a backed open hearth below the smoke hole. The backing con-

FIG. 11—A Tungus shaman in ceremonial dress.

sists of clay-plastered logs leading up through the smoke hole. Against these, burning logs are set on end. The smoke rises better, and the wide, approximately upright surface of the glowing or flaming wood distributes the heat more effectively than the horizontally laid fire of the ordinary box hearth. In *balagan* and *golomo* the chinks between the logs are stopped with moss and earth. Snow is thrown on so as to cover the whole. With the first sunny days of any length these dwellings become uninhabitable. The Tungus sybarite returns to his *chum*.

Native Tribes of the Region

Of the present native inhabitants the vanishing Yenisei-Ostyak have been longer on the river than anyone else. Originally they were neighbors, though of very different origin, to the Samoyed in the mountains of the south—the Altai and the Sayan. Hundreds of long Siberian miles, the Yenisei- and Ugrian-Ostyak, and several mixed Turkic tribes now separate the Samoyed from the remnants of their ancestral stock in the south—the Kamasintz of the Sayan foothills and neighboring steppes.[6] Like the other inhabitants of the northern region they now occupy, they have been driven thither by the pressure of the restless Turki and Mongols in the south. Long as their residence in the Arctic has been, it would seem that both they and the other immigrants have retained many of the qualities of mind and temper which they developed in other surroundings. How else account for the different manner in which they and, say, the Tungus respond, in this inner sphere, to the same environment?

The Tungus

The Tungus is a practical person, unemotional, cheerful, with a slightly cynical outlook upon life. He believes implicitly in his shaman, it is true, but he attends to the things of the spirit to which the shaman ministers chiefly when some immediate practical need arises, some immediately personal crisis. The phenomena associated with illumination which are so impressive in the north do not appear to affect him greatly. Ask him what name he gives to the flickering fingers of the northern lights that beckon in the sky above him. He cocks a casual eye at the display and answers without interest: "It burns." The return of daylight is not welcomed by any ceremony. His first recognition of the participation of any power outside himself in the changes of the year will be, perhaps, a private visit to a shaman to get him to dedicate to the great god of good luck, the "owner" of all wild reindeer, the charm by which he hopes to procure himself a good season's hunting. Or, at most, there will be some quite local shamanizing at the first bit of open water to appear in which fishing is practicable.

To maintain a cheerful spirit in the face of the bleak dreariness of the north is apparently a principal condition on which man can endure its rigors. At any rate a disposition to enjoy whole-heartedly what simple pleasures life affords is everywhere apparent. The Tungus advise the alien wayfarer in the tundra to eat much and laugh often, and with both Tungus and Samoyed this is not less a matter of practice than of precept. But the Samoyed is a much more emotional person. It is impossible to think of a dignified Tungus pater familias watering his pannikin of tea with salt tears as he listens to a phonograph reproducing the dirge for the dead wife of his

[6] Recent investigations tend to throw doubt on the conclusion reached by Castrén that this region of the Sayan Mountains was the original home of the Samoyedic stock. In any case, however, they are Neo-Siberians of southern origin—southern, that is, in relation to their present habitat.

youth which he sang beside her grave thirty years ago and repeated just now by request into the wonder-working machine in expectation of the cheering cup. The story-tellers vie with one another in relating the prodigies performed by heroes or heroines in pursuit of the objects of their passion. The change of season, the return of the friendly sun, is the occasion for the most elaborate of their ceremonies, to take part in which numbers of people travel great distances, suspending for the time being even the strict rule which forbids a woman to ride on a man's sledge. The grim aspects of the Polar environment, the deeper, longer darkness of the still farther north, have sunk into their souls. After the Yurak spring festival of the changing of the sledges of the gods, the old abandoned vehicle shrines are left on a hill, the runners pointing north towards the land of darkness and evil, of desolation and of things forgotten, and the new sledges with the rejuvenated gods in their places are headed south, where dwell the powers of light and good, and where the sun, describing his low arc, brings promise of a lengthening day.

FIG. 12—A Limpiisk Tungus of the Hukachar clan, showing *maaya* (fillet of squirrel tails) worn by married women.

THE YAKUT

Latest comers of all into the Arctic are the Yakut, a Turkic tribe, pushed northwards first by the Mongolic Buryat and more lately driven still farther north by the Russians, with whom in the seventeenth century they fought a notable fight. Their old occupation as herders of cattle they have not given up even on the miserable swampy pastures of the Vilui. Pushing hence northwestward toward the Limpiisk Tundra, they have already displaced and sent still farther north to press upon the Samoyed near the right bank of the Yenisei a group of Tungus, partly Yakutized in a physical sense, wholly so in their language, the Dolgan. On the eastern border of

the Limpiisk Tundra, the Yakut have perforce abandoned the keeping of cattle and become deerherds like their Tungus neighbors. They do not confine themselves to this, however, and their herds are small. The headwaters of the Vilui are not far, as distances in the tundra go, from Lake Yessei, the eastward limit of Tungus wanderings in this part of the region. On the Vilui are other Yakut, and the river is a highway to the southeast where the Russians are settled on the Lena and where articles which prosperous Tungus herders desire may be obtained. This is the canny Yakut's opportunity. He becomes a trader and acquires much more wealth than his brothers on the Vilui with their half-starved little herds of cattle. To the Tungus both as producer (of furs and skins) and consumer (of tea, tobacco, rye meal, etc.) he is middleman and earns not a little of the unpopularity which often goes with this calling. It is the only instance in the northern Turukhansk District of the influence of a physical feature in causing a noticeable differentiation of existing cultures, and it affects only a small group. Elsewhere the general sameness of conditions allows no scope for anything of the kind.

Nomadism and Tribal Relations

A true coast culture of fishermen or sea-hunters is not found within this region. The few people who frequent the coast proper of the Arctic retain their reindeer and do not usually remain near the sea in winter. In the tundra there are no barriers for people once acclimated to its hard conditions. The limits of the wanderings of a tribe are a matter of agreement with its neighbors (an agreement now given the character of law by Russian sanction or regulation) and the possession of the means of travel. The possession of reindeer implies this of necessity. Even a small herd soon consumes the moss in any particular locality. When the bucks begin to stray, the herdsman knows that it is time to strike camp and follow the herd to new pastures. It is not a matter of seasonal nomadism like that of the horse nomads in the south; the reindeer-breeder's wanderings have no periodicity; they depend, within the limits of the tribal territory, on the size and appetite of his herd.

The complete absence of any bond of attachment to the soil, this free-wandering mobility of all the tribes, the sameness of conditions under which life must be lived, all the circumstances tend to a general leveling and unifying of the Arctic cultures. Yet, under the obvious surface resemblances there still survive the peculiarities of belief and of social observances which long ago differentiated the various stocks of which the present population is made up. And there are evidences of an instinctive determination among the tribes to keep themselves distinct, as well as of the inevitable merging of their cultures into one another. The elaborate terminology of the chief industry, reindeer-breeding, which must have spread from a common center—the Limpiisk Tungus acknowledge their indebtedness to

the Samoyed in this matter—is distinct in every group. The original exogamous social organization of the Tungus has been converted by the necessities of their present life, which has led to the scattering of the original groups over great distances, into the practice of intermarriage within the group or, on their borders, of an extra-tribal unregulated intermarriage; but the old clan names persist. So, too, do the old inter-tribal jealousies in spite of the establishment of a Russian peace. It will require a whole day's session of the yearly *munyak* and all the strenuous effort of a pro-Yakut Tungus "prince" to compose a dispute on a point of etiquette between a Yessei Yakut and a Limpiisk Tungus. Rival Samoyed and Yakut shamans pursue their quarrels beyond the grave; the victor in the struggle on this plane of life does not escape the posthumous enmity of his apparently beaten antagonist. A Tungus shaman sends a familiar grown mischievous to his own people to exhaust his malice upon the alien Samoyed. Like surroundings and like interests in the struggle for existence may do much towards the fusing of cultures and stocks, but the inveterate distinctions of belief and usage die hard.

DONGOLA PROVINCE OF THE ANGLO-EGYPTIAN SUDAN

By LOUIS C. WEST

Dongola Province, the most northern but one of the administrative divisions of the Anglo-Egyptian Sudan, lies between the parallels of 16° 0′ and 19° 40′ N. west of an irregular line in about 32° 30′ E. (Fig. 1). Essentially, however, it comprises the Nile Valley from the Third Cataract to the Fourth Cataract, both of which, except for a few months each year when the Nile reaches the highest point of its annual rise, effectively bar river navigation. There are at present two practicable ways by which the traveler may enter the province. The first and easiest is by the branch railroad which extends to Kareima at the foot of the Fourth Cataract from Abu Hamed, which has rail connections with Egypt, Khartum, and the Red Sea ports of Port Sudan and Suakin. The other available route is by camel or horse from Wadi Halfa at the foot of the Second Cataract through the Batn el Hagar to Kerma at the head of the Third Cataract. This is the historic trade route into the Sudan which we know was in use as early as the Sixth Egyptian Dynasty, some 4,500 years ago.

On the rocks which face the river at Tombos, six or seven miles from Kerma, are the well-known inscriptions carved by the generals of Thothmes I to record the fact that his armies had reached the fertile plain of Dongola and that his empire stretched from this point to the Euphrates. During the war with the Mahdi and his successor the Khalifa, the English built a railroad for military purposes from Wadi Halfa to Kerma; but service over this was discontinued some seven or eight years ago, and the rails were in large part removed. The reason given was that the sharp gradients on the line made its operation unprofitable; the real reason seems to have been an effort to force the province to use the railroad at the southern end of the district and in this way to come into closer economic touch with the rest of the Sudan. So far this effort has been a failure: the profitable export business with Egypt which might have been easily developed has been crippled and no corresponding gain made in the amount of trade with Khartum. That such efforts forcibly to divert the direction of a country's trade are unscientific is shown by the long lines of camels which daily cross the dismantled railroad line near Kerma on their way to and from Wadi Halfa.

Soil and Agriculture

With a more industrious population Dongola would be a land of amazing prosperity. Its soil is said to be the most fertile in the Sudan, but as a result of universal disease, of successive low Nile floods, and of a generally indolent population there is only a narrow strip of cultivation along the river. From Kareima to Ambigol the land on both sides of the river is

cultivated; from Ambigol to Dongola one or the other bank is cultivated, but rarely both. In favorable years the district between Kareima and Ambigol may be compared with the Fayum rather than with any other part of Egypt south of Cairo. In the winter of 1913-14, however, the province was suffering from the effects of an unusually low Nile. In many places the river was flowing between banks that were absolutely barren except for the

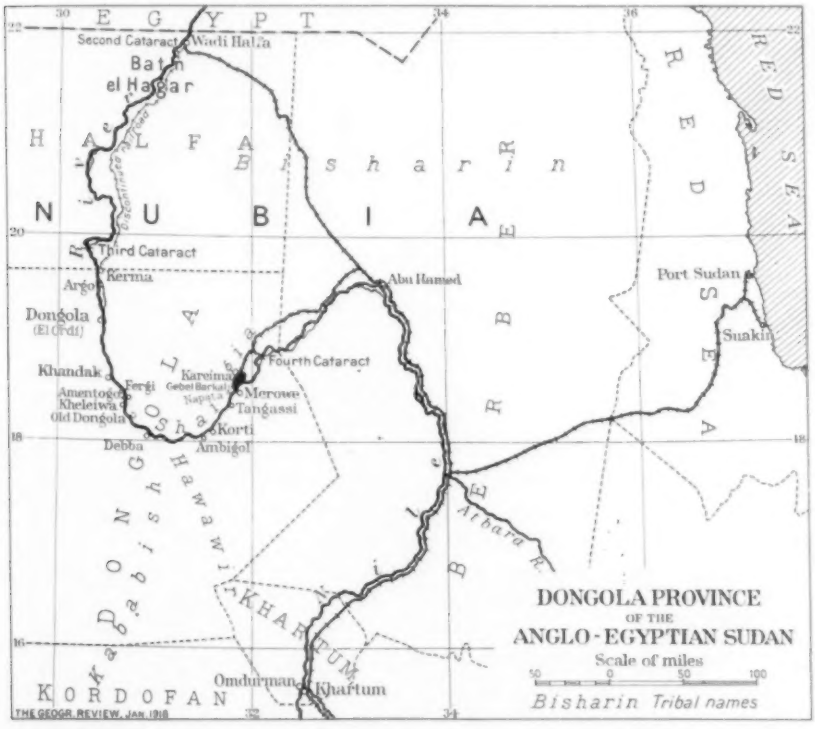

FIG. 1—Sketch map of Dongola Province and other parts of the northern Anglo-Egyptian Sudan. Scale, 1:7,400,000.

thorn bush; at other places the strip of cultivation varied in width from a few yards to a mile, seldom if ever within the limits of the province exceeding the latter width.

The main crops are durra, wheat, *simsim*, barley, and dates. In a favorable year three crops of cereals may be grown, two for example of the fast-ripening durra and one of the slower wheat or barley. The dates are both plentiful and excellent, forming the chief article of export. Some senna grows wild and is sent to Assuan or Kordofan. The people do not realize the possibilities of their land and probably never will until they are replaced by skilled industrious workmen such as the *fellahin* of Egypt.

FIG. 2—Group of Dongolawi women.

Several varieties of native vegetables are grown, and occasionally one will find a patch of watermelon. Potatoes are altogether lacking, as are fruits. There is but one orange grove in the district and that is in the garden of the English governor at Merowe. So far little effort has been made to grow cotton, a crop the government is making every effort to advance in the country nearer Khartum.

Animal Life

Of wild animals the province has the addax, a rare species of antelope; a handsome gray fox with large ears and tail; and the ever fascinating gazelle. The pariah dog of the province, an animal half wild and half tame, is a small greyhound, altogether unlike the mongrel seen in Egypt. In certain parts of the river crocodile abound, while on the desert one occasionally sees the warena, the so-called land crocodile, but in reality a large lizard. Chameleons are often seen, particularly on the walls of houses when they are stalking flies. Unlike the familiar reptile sold by our street fakers, these chameleons are sometimes three or four inches in height. They look extremely formidable but in reality are harmless, their only weapons of offense or defense being their power to change color and their long sticky tongue.

Camels are extremely numerous and of a good quality. Their hair is a recognized article of commerce and is woven into various articles for household use, but not, I believe, into articles for personal wear. Camel-hair runners, 20 inches wide and 9 or 10 feet in length, are sold by the weavers, who furnish all their material, for about 50 cents, or the equivalent of three days' pay of an ordinary laborer.

Some twenty years ago the breeding of the small active Dongolawi horse was a flourishing industry, but at present this seems totally abandoned; horses in fact are seldom used by the native population. Donkeys are everywhere; the majority as despondent-looking and as ill-treated as they are elsewhere in the East, while a few are of great size and strength. There are also countless goats, some cattle, and a few oxen. The cattle are largely used to drive the *sakiyehs* (water wheels) and are only rarely killed for food. What the goats find to live on is one of the great mysteries of the Sudan. Every morning they are driven out on the desert to be brought back only at sunset. Always emaciated and hungry-looking, they still manage to exist, feeding mainly on the tiny leaves of the desert thorn bush, and to yield their owners a thin ill-tasting milk. Every family has its flock of fowls, each one a little tougher and a little less palatable than the others. Eggs could be bought in the winter of 1913-14 for about five cents a dozen, while live sheep sold for 60 cents to $1.50 apiece.

Of less agreeable "animals," the scorpion, nimetta, and white ant hold first place. The nimetta, a very small fly, infests the region from Delgo to Korti during the winter season, November to April. These pests fly in

dense clouds, and the countless bites which they inflict bring on an extreme irritation often resulting in a slight fever. The nimetta is disliked, not because of any danger from fever that may arise from his bites, but simply because of the discomfort he causes. He finds his way into one's hair, ears, nostrils, mouth, and at times becomes absolutely unbearable, neither the face veils worn by the Europeans nor the smudges carried by the natives being of any effect. The only thing to do is to keep moving. Fortunately the nimetta is active only in the daytime and then only when the wind is comparatively quiet. The white ant is not common. Rarely one will see a beam of wood eaten through and through until hardly more than the shell of paint remains; but, as thorough painting prevents its ravages, this insect is not greatly to be feared.

Scenery and Mirages

For agricultural purposes, the almost negligible rainfall is of no value. The farms are irrigated almost without exception by water taken from the river by means of the *sakiyeh*, or water wheel (Fig. 3). Traveling along the river one passes a constant succession of *sakiyeh* pits with their grass screens, their crude creaking wooden wheels, their dripping earthen pots fastened to the revolving rope, their blindfolded bullocks or cows urged on by little boys or girls. The *shaduf*, or water sweep, so common in Egypt, is apparently not used in the province; none at least was seen there during a five months' residence.

There is little of interest in the landscape with the exception of the daily mirages and the wonderful color effects of the sunset. Beyond the narrow strip of cultivation, vivid in its green, and with its tall waving palm trees, there is only the desert with its yellow sand, its thorns and acacias, and its dazzling sunlight. At places hills and peaks rising abruptly out of the desert give variety and a certain charm to the view. The mirages are at first of great interest. Standing on the desert in the middle of the day one appears to be in the center of an island, so perfect is the resemblance of the mirage to water; yet as one advances the "devil's river," as the natives call it, constantly recedes in the distance.

There are two kinds of mirages, the so-called sky mirage and the so-called ground mirage. Both are caused in the same way: by the superposition of two layers of air of such difference in specific gravity or density that their plane of contact forms a reflecting surface. When this reflecting surface is below the level of one's eye, as it practically always is, we have a ground mirage. Here one sees nothing but the reflection of the sky, which, by making the reflecting surface appear blue, gives it a perfect resemblance to water. This resemblance is increased by the effect of the wind, which causes waves, and by trees or other objects which may project through the reflecting surface of the mirage and cast their shadows upon it. Occasionally one will see a string of camels, or a line of walking men with their legs

completely hidden below the reflecting surface and looking for all the world as if they were wading through a shallow lake.

When the reflecting surface happens to be above the level of one's eye, we have a sky mirage. In this is seen nothing but the reflection of objects actually on the earth, these objects of course appearing upside down. The

FIG. 3—A Dongolawi *sakiyeh*, or water wheel. (Photo copyright by G. N. Morhig, Khartum.)

effect on a small scale may be obtained by holding a mirror above one's head and watching the reflection of objects on the floor. No man ever saw in a sky mirage the reflection of an oasis with the palms standing right side up. Such a thing is optically impossible; just as much so as would be the reflection of some object not actually in existence on the earth.

THE INHABITANTS

The main interest of the country is not in the scenery but in the people. The agricultural population on the river banks forms physically as well as geographically the link between the true negro to the south and the Egyptian to the north. Ethnologically these people may be classed as Nubas or Barabra. They are smaller and darker than the Egyptian, but still not black, even though many of them have the short kinky hair of the negro.

Less negroid in appearance are the two nomadic types one meets in the province: the nomads who live along the river banks and those who live out in the desert. The former are known as Gararish while the desert tribes are Bisharin, Hawawir, Kababish, and Shaigia. Though Arabic is generally

spoken by these people it is not their native tongue. From Wadi Halfa to Kerma the people speak a Nuba dialect known as Mahasi; from Kerma to about Kareima, a dialect known as Dongolawi.

Owing to the extensive slave trade formerly carried on in the district and to the great number of slaves still there, the population contains many pure negroes and half-blooded negroes. In addition there are a few Turks, a few Greeks, a few Egyptians, and possibly a few true Arabs. Every free man in the province claims to be a full-blooded Arab himself, but this claim has no basis in fact. The Arabs, it is true, dominate the northern Sudan and do this without having exterminated the former inhabitants or even having entirely supplanted the native dialects. Contrary to their usual custom they intermarried freely with the natives in former times and have so impressed their religious ideas and political theories upon the people that many of the native customs have entirely disappeared and others, like the local dialects, are being gradually stamped out.

FIG. 4—Entrance to a courtyard of a native house near Kerma. The plates over the door are supposed to bring good luck.

DRESS

Having crossed the desert that separates Abu Hamed from Wadi Halfa, the traveler notices at once differences in the native customs as compared with those of Egypt. For one thing, the face veil is generally absent and the women seldom cover their faces at the approach of men. Then there is the general use of white clothing by the men in place of the black almost universally worn by the peasants in Egypt. South of Khartum dress is still largely a matter of ornament, but in Dongola, despite the great heat, the people dress in about the same way as in Egypt. The peasant woman, like the man, wears a pair of drawers resembling the lower half of a suit of pajamas but fitting tightly just below the knee. Over this a sheet of cotton is fastened around the waist so as to form a kind of skirt. Usually there is another sheet fastened around the shoulders so as to form a blouse, but this is often omitted. The Egyptian woman, if she is of the peasant class,

always has her upper garment so arranged that she can pull it across her face on the approach of a strange man. The upper part of her body and the back of her head are always covered; and, if she happens to be a woman of position, her arms and hands are never left bare. Such niceties of dress and etiquette are altogether unknown, or at least are not practiced, by the Dongolawi woman.

The essential part of a young girl's dress is a short skirt made of many leather thongs, 10 or 12 inches long, tied to a cord which is fastened around the waist. Over this a skirt may or may not be worn, as the fancy of the wearer dictates. Boys of the same age wear simply a loin cloth. Very little girls and boys run naked, their only ornament being a bracelet or a charm hung around the neck, by means of which disease and particularly the evil eye may be averted.

FIG. 5—In the market at Kerma. Hair plaits such as those worn by the girl were in use 4,000 years ago.

Unmarried girls wear the hair braided into hundreds of tiny plaits, exactly in the fashion which ancient cemeteries show was followed 4,000 years ago (Fig. 5). The women, both married and unmarried, use hair oil in abundance, so much of it in fact that often in the hot sun one will see it dripping onto their shoulders. All are equally fond of jewelry: necklaces of gold, amber, or glass beads; earrings, nose rings, finger rings, bracelets, and anklets of gold, silver, brass, or ivory. Shells or bright glass beads are often tied to the hair, while on the forehead a large flat ring may be worn. Without exception, the men wear small leather charms tied to the arm or round the neck. These, to be efficacious, contain small pieces of paper covered with magical verses. The people believe that though one such charm is a protection still no harm can come from wearing more, and often a man will have from ten to fifteen fastened to his body.

THE LIFE OF THE PEOPLE

Despite the general disinclination to work, the people make, if sufficiently urged, efficient laborers. Their skill and ingenuity in mechanical lines is amply shown by their handsome, highly colored baskets, their well-known *damur* cloth, and their tasteful jewelry. Men have been known to walk

200 miles for a chance to earn 15 cents a day, but this is only under the urgings of great need. One man, when asked why he had given up a place where he was making 17½ cents a day, as much if not more than he had ever earned before, replied that he could not live on that money and so was doing nothing. Almost without exception a man will work only until he has saved enough to permit his loafing for a few days; then, when his money is gone, he will seek work again, and the process is repeated. On 15 cents a day a man can raise and support a family, and the great bulk of the people are living on practically this amount. It is just enough to support life; needless to say there is no opportunity to buy anything but the bare necessities, no chance to save against a low Nile and the resultant partial or complete failure of the crops. During the year 1913-14 the northern Sudan passed through a period of famine. The suffering can be better imagined than described. Not only cattle but human beings died of hunger. In such a time the bad traits of a people all come to the surface. Many of the able-bodied men went elsewhere, leaving their wives and children to get along as they could. Some of these men, but apparently only a few, sent part of their earnings home; the rest seemingly forgot they had any family obligations. The few who had grain kept it. Unlike the fortunate in Egypt, they refused to share with those who were hungry. Many even refused to sell, despite the high prices they were offered, believing they could make still more by holding their grain until it could be sold as seed at the next high Nile. The government did what it could. Emergency relief work was started on which a man or woman could make 7½ to 10 cents a day; grain was imported and sold at cost or even given away. But despite utmost efforts, the women and children, who enlisted special sympathy, proved hardest to provide for and consequently suffered most. Even when crops are good the poorer people are barely able to get along; one young boy was heard to say that he had never had enough to eat, and that everyone was always a "little hungry."

The Sudan is one of the few countries where slavery is still legally recognized. The slave trade, it is true, was abolished after the downfall of the Khalifa and certain regulations enacted by which the condition of the slave was bettered. But as long as the rule remains that every child of a slave mother is a slave, there can be no great decrease in their numbers. Apart from the fact that his freedom of action is necessarily limited, the slave calls for no pity. Outwardly there is nothing by which he can be distinguished from his owner, and the general standard of living is so low that even in this respect he is little worse off than the free man. As a general thing a slave is kept busy on his owner's field, but often he is allowed to go away, or he is sent away, to seek more profitable work. Under such circumstances he is allowed to keep a part of his earnings, sometimes half, sometimes more.

As in Egypt, girls are married at an extremely early age. In the selec-

tion of their husbands their inclinations or desires have little if any weight. Matchmaking is altogether the business of the parents or guardians, and it is the boy whose family is prepared to pay most that has first choice. As among the peasants in Egypt, a cow, a buffalo, or its equivalent is usually the price paid to the girl's father. When we remember that a woman is a worker and an active producer it does not seem illogical that the father should be recompensed for the economic loss he suffers when a female member of his family departs. Although every family desires its first child to be a boy, perhaps the majority want a girl as the second. As one father said, a boy costs money, but a girl brings it in. The greater the number of children in a family, the more pleased are both the father and the mother. One man who was said to have eighteen sons was the envy of the surrounding country, but families of this size are rare.

Education

A vast majority of the population in Dongola Province can neither read nor write. Even if there were any interest in affairs outside of the village, the cost of the cheapest newspaper would be beyond all but the favored few. There are a few boys' schools in the province, but so far their benefits are limited to the families who live in the immediate neighborhood and who at the same time are able to bear the financial loss arising from the boys' absence from work. These schools are under the government ministry of education, are visited at least once a year by government inspectors (Englishmen), and on the whole are doing splendid work. The character of the teaching may be inferred from the fact that the "higher mathematics" given in Gordon College, the head of the educational system, is about equivalent to the mathematics given in one of our better high schools. There is, however, a constantly increasing desire on the part of the people for an education. A striking example of this may be seen in the case of an Egyptian army officer who was stationed as *mamur*, or mayor, of the district of Argo. He was resigning his position and his chance of a pension so as to be able to take his daughter to Cairo for her education. Some time previously he had obtained special permission for her to attend the local boys' school but was dissatisfied with that. He himself was a good example of the better-class Egyptian. His army record was good, his administrative efficiency as *mamur* was beyond serious criticism. He spoke Arabic, French, and English. In conversation one day he brought up the subject of America. To explain some statement he was trying to make he drew a map of the Mediterranean, of England, and America. The United States appeared as a small island, with New York on the western side. That American farmers had no occasion to irrigate, as the country had enough rain for all agricultural purposes, seemed especially remarkable to him, as indeed it did to every native. A word picture of the Woolworth Building he absolutely refused to believe.

FIG. 6.

FIG. 7.

FIG. 6—A small store in the desert.
FIG. 7—A typical Dongolawi house.

FIG. 8.

FIG. 9.

FIG. 8—A sheikh's tomb near Kerma, built of mud brick.
FIG. 9—A ruined mud brick temple dating from 2000 B. C.

A Trip Down the River

Three days are necessary for the trip down stream from Kareima to Kerma, a distance of about 200 miles. For the return trip, up stream, the little steamer takes five days, making on the average 40 miles a day and tying up for the night. The word hurry and the necessity for it are both unknown in the province.

Leaving Kareima the first sight of interest is Gebel Barkal. At the foot of this "Sacred Mount" is the cemetery of the ancient city of Napata, which

Fig. 10—Date palms growing through the drifting sand.

lay directly opposite on the west bank of the river. Napata was the home of the Ethiopian kings who in the eighth century B. C. conquered Egypt and held it for about two generations, when they were finally driven out by the Assyrians. In imitation of the Old Kingdom in Egypt, the people of Napata erected little pyramids over the bodies of their dead kings. Eight or nine of these are still standing in a good state of preservation. They vary in height from 40 to 60 feet, being far smaller than their enormous prototypes at Gizeh, the two largest of which tower 450 feet in the air.

About four miles beyond Gebel Barkal is the town of Merowe, the residence of the English governor of the province. The town is new, with wide streets lined with shade trees and with handsome red and white houses, built for the use of various government officials. Just beyond Merowe is Tangassi, whose market is known throughout the Sudan, being exceeded in size only by that of Omdurman. At Debba, some distance farther down

stream, the river makes a gigantic bend to the north. From beyond Kareima it had been flowing toward the southwest but it now definitely turns toward the Mediterranean, flowing northward from here with hardly a bend of any great size. In the famine of the winter of 1913-14 Debba was the center of the stricken district of the province. As the steamer pulled up to the bank, crowds of women and children came running down to the landing place to meet it. The picture they presented was one that no one wishes to see twice. As we walked ashore every hand was stretched out for gifts, but not a person, old or young, made any audible plea for money. No words could have made so powerful an appeal as the mere presence of those shrunken, shrivelled forms. At the sight of money a perfect riot broke out. One man, thoughtlessly giving away small coins, was in an instant the center of a howling mob from which it took three policemen to rescue him.

Formerly Debba was a town of considerable importance. Here the ivory and gum traders bringing their wares from Kordofan and Darfur exchanged them for European goods. At present its chief importance arises from the fact that it is the farthest point regularly reached by the sailing boats from the northern end of the province. As is the case in Egypt, Dongola Province has an almost constant north wind. This carries laden sail boats as far as Debba easily and quickly, but owing to the great bend in the river here, one finds if he tries to proceed farther that the north wind which so far has been a following wind is now a head wind. Articles could be sent from Dongola to the railroad by the government steamer, but to save money the native merchants usually send their freight by native sail boat to Debba, where it is transshipped to the steamer for the rest of the trip.

Old and New Dongola

A short distance from Debba is Old Dongola, now altogether deserted, but once the capital of a Christian empire which flourished here during the sixth century. The floor of the old church is still to be found under the mosque built by the Arab conquerors to replace it. Close by are the remains of a large fort, around which lie the tumbled ruins of the mud brick houses of the old inhabitants.

Christian remains are found at many places in the province, at Khandak, Fergi, Kheleiwa, and Amentogo. Directly above the landing place at Khandak is a large imposing mud brick fort. To judge from the potsherds which lie under foot, this structure was first built in early Christian times and then rebuilt and re-used at a much later date. Khandak itself is a town of no great interest, its chief importance in the eyes of the traveler being its manufacture of the highly colored baskets which are offered for sale here.

Dongola, or El Ordi, as it is known to the natives, is situated about 40 miles beyond Khandak. It is the largest village in the province, containing sixty or seventy permanent shops, four or five mills for grinding grain, a

FIG. 11.

FIG. 12.

FIG. 11—Typical view of an Upper Nile cataract. (Photo copyright by G. N. Morhig, Khartum.)
FIG. 12—A boy using a reed canoe in the rapids at Tombos.

small hospital, a doctor, and three English officials—half of the entire white population of the province. The last telegraph station in the province is located at Argo, about 30 miles north of Dongola, while Kerma, some 8 miles farther, is the last station reached by the government steamer. Owing to the dangerous channel the boat can only reach Kerma during three or four months a year; for the rest of the time it stops at Dongola or Argo, as the state of the water or the whim of the engineer dictates.

Antiquities

Near Argo is a ruined temple, next to the Napata remains the best known antiquity in the province. The plan of the building can hardly be made out, no trace of the walls appearing above the mounds of rubbish and debris which now cover the site. At either side, however, of what was once the main entrance lie two colossal statues of some unknown king; while in the courtyard is standing the famous headless statue of Sebekhotep, a king of the Thirteenth Egyptian Dynasty, who reigned about 2,000 years before Christ. At Kerma are the interesting cemeteries described in the *Bulletin of the Boston Museum of Fine Arts* for April, 1914, while just beyond, at Tombos, on the rocks which overlook the cataracts there, are the stelae erected by Thothmes I.

This list of antiquities, while interesting to a few, is not such as will tempt the traveler any farther from the railroad than Gebel Barkal. But for those interested in getting away from the crowds of tourists who infest Egypt, no more interesting trip could be planned than one by horse or camel from Wadi Halfa to Kerma through the wild beauties of the Batn el Hagar and thence by steamer to the railroad at Kareima. The country is absolutely new as far as tourists are concerned, in the winter of 1913-14 but two persons other than government officials and a Cairo-Khartum aviator visiting the northern end of the province.

A NATURALISTIC MODEL OF KILAUEA VOLCANO, HAWAII*

By ROBERT W. SAYLES

Curator, Geological Section of the Harvard University Museum

There has recently been placed on exhibition in the Geological Section of the Harvard University Museum a large and remarkably naturalistic model of Kilauea, the active crater on the eastern slope of Mauna Loa, the great volcano on the island of Hawaii. It is the work of Mr. George Carroll Curtis of Boston and embodies the ripe fruition of his many years of effort in the production of relief models that are true to nature. In some respects a study of this model will give to the student a clearer understanding of the great crater than he could obtain from pictures, descriptions, or even a visit to Kilauea itself.

The work on the model was begun in March, 1913. Mr. Curtis went to Hawaii and spent three months at the crater, making a careful photographic survey, supplemented by elaborate field notes, color sketches, and detail drawings.[1] Mr. F. W. Haworth devoted several months to the making of a series of aërial photographs of Kilauea from kites half a mile or more above the ground. The working up of the material gathered and the execution of the model consumed forty months in all.

The model, which is of circular form, with a diameter of fourteen feet, is on the scale of 1:1,500, or 125 feet to the inch. The underlying conception of the model implies that there is no vertical exaggeration. The extensive encircling cliff around the lava "sink" has, in the model, a height of from two to six inches, while the great caldera measures about ten feet across. The purely mechanical work of building up the raised map which forms the basis of the model took six months and the coloring about the same length of time. The incorporation of the vast amount of detail from photographic records, sketches, and field notes consumed the remainder of four years of careful personal work.

* The writer wishes to express his appreciation of the valuable assistance rendered Mr. Curtis in his preliminary work while at Kilauea by Dr. T. A. Jaggar and Dr. H. O. Wood.

[1] G. C. Curtis: Work Going on at Kilauea Volcano, *Science*, Vol. 38, 1913, pp. 355-358.

EXPLANATION OF FIG. 1—The observer looks northwest across the great lava "sink," in which, on the left, is the active pit of Halemaumau (House of Eternal Fire). The rim of the caldera is seen almost in its entirety from the northeast around to the southwest. In the distance, the cone of Mauna Kea and the long gently dipping slopes of Mauna Loa. In the foreground, Keanakakoi Crater and the border of the Kau desert; smaller extinct pit crater on the right. In the left foreground note the very young, consequent drainage system, cutting the ash-cover surface, and its intersection by lines of faulting. This stream system, unknown before, was brought out by the kite photographs made for the model. An opera glass facilitates locating on the model the "bomb" craters among these channels. The automobile road leading to the active crater may be traced.

FIG. 1—Photograph of the Kilauea model, giving a general view of the crater. (For explanation, see bottom of opposite page.)
(Figs. 1, 2, and 3 from photos by Burr A. Church; descriptions by G. C. Curtis.)

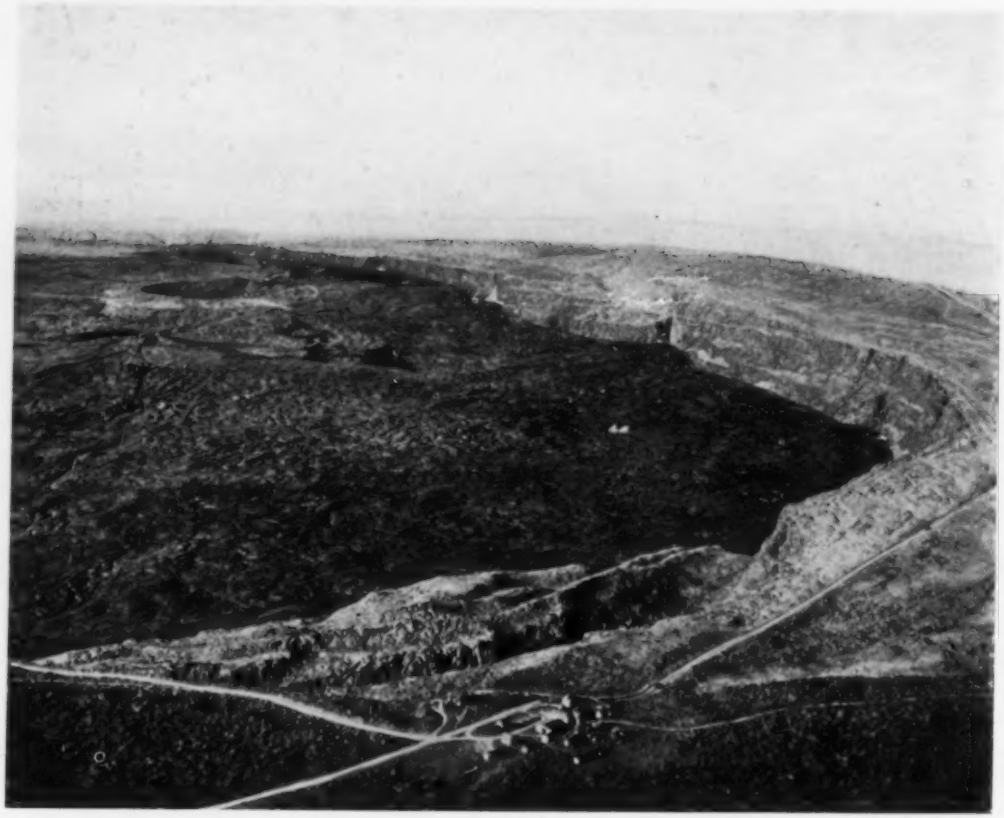

FIG. 2.—Photograph of the Kilauea model looking southwest over Volcano House across the lava sink. In the foreground is the forest, mostly *ohia* trees. The vegetation gradually fades out toward the active crater. The great escarpment may be followed, and in the middle distance lies Halemaumau, where, in the lake of molten lava, the legendary fire goddess Pele has her abode. The dark gray filling of the extensive caldera is built of multitudes of lava-flows, mostly the smooth, or *pahoehoe*, variety, the darker patches being the rough *a-a* (first brought out by the model). In the distance the dim outlines of Mauna Loa, 13,860 feet, may be seen. Note the old "horse trail" crossing the middle of the lava.

FIG. 3—Photograph of the Kilauea model looking northeast across the pit of Halemaumau, the molten lake with its fiery fountains being just visible. The liquid lava is 350 feet below the rim of the crater. The observation hut maintained by the Massachusetts Institute of Technology is on the left just back from the rim. Sometimes the molten lava rises nearly to the top of the pit, and again it will sink away so as to make the crater about a thousand feet deep. The dark gray lava field reaches to the base of the encircling caldera walls, in which the old bedded structures of ancient lava flows, ash beds, and a laccolith may be observed. Talus is seen in several localities at the base of the escarpment. In the left foreground is the summit point Uwekahuna, under which lies a stairway of great down-faulted blocks. Note the Volcano House group of buildings in the right distance, to the left of which is the brilliantly colored Sulphur Bank and, behind, the dark forested slopes of the Kilauea cone.

The most notable relief model of a similar nature made in the United States before this was a model of the coral island of Bora Bora, made by Mr. Curtis at the suggestion of Alexander Agassiz to illustrate a typical high coral island, and installed in 1907 in the Harvard University Museum. It was the first important work of its kind undertaken in America and was based upon photographic and other special surveys. This model and the general question of naturalistic models and their educational value were discussed by Mr. Curtis in an article entitled "Land Reliefs That Are True to Nature" in the *Bulletin of the American Geographical Society* for June, 1911.[2]

Habitat groups of animal life have become almost a necessity in up-to-date museums, but before the work of Heim in Switzerland and Curtis (who studied under Heim) in America natural representation of earth forms had not been developed. The Bora Bora and the Kilauea models in America, therefore, mark the beginnings of what may be called a new art. While zoölogy and botany have been profiting for some years by the naturalistic or habitat specimens, the development of natural land relief types has nowise progressed to the same extent. It seems to the writer that the main reason for this slow progress is the difficulty of finding individuals who possess the qualifications necessary for such work. To do the work which Curtis is doing one must be a geologist and geographer first of all, and, in addition, an artist, surveyor, photographer, and sculptor. To find the combination of all these accomplishments in one person is difficult indeed. The high cost of the models also has hindered the progress of this work. With kite or airplane photographs, however, the cost of the work will undoubtedly be cut down one-third, or perhaps one-half, and the time necessary to make an elaborate model will also be reduced in proportion. Instead of requiring nearly four years, the Kilauea model, Curtis calculates, could have been finished easily in two years or perhaps much less, had he been in possession of these bird's-eye views during the first year. As it was, the kite views were not obtained until the third year of the work.

A decade has passed since Bora Bora was finished. During that time several new steps in the art have been taken. The first was the use of a revolving panoramic camera, by which five continuous miles of the Kilauea walls were brought into one view on the full scale of the model, assuring complete and accurate modeling of the intricate and seemingly infinite detail of the complicated outcropping structures. The second was the use of aërial photographs, without which reproduction of the forms of the vast and complicated lava floor would hardly have been possible. This lava sink alone took a year of modeling. Features never before observed, like the drainage system on the southeast, the location and distribution of fault cracks and of bomb craters, were first brought to notice by these photographs, although previously the region had been much examined. A third

[2] Vol. 43, 1911, pp. 418–427.

innovation is the cycloramic background, which in a highly satisfactory way solves the old and perplexing problem of how to treat a large area within the limits of museum space. This was accomplished by the addition of a background which continues the modeled area through the painting of the natural surroundings in perspective. This not only gives additional information but supplies the familiar, natural environment, lack of which has badly handicapped other work.

The result of all the various means which Curtis has used in the making of the Kilauea model speaks for itself when we view the finished work with or without an opera glass. The writer finds that a six-diameter field glass is even better than an opera glass. The effect is almost that of being at Kilauea itself instead of thousands of miles away.

THE MILITARY CAMPAIGNS AGAINST GERMANY'S AFRICAN COLONIES

By G. M. WRIGLEY

Our measure of military operations is chiefly determined by the events that have happened and are happening in Europe on the western front. We appreciate the significance of the gain of a few hundred yards of terrain, of the capture of a hillock one or two hundred feet high, and we accept the cost paid in hundreds of lives. What then shall we say of the conquest of 300,000 square miles of territory—an area half as large again as Germany—in a period of six months at a cost of less than two hundred lives? Here, in German Southwest Africa, as also in the other African campaign areas, we find warfare on a different plane, controlled by profoundly different conditions. We are here concerned with the geographical aspects of these conditions. The force of geographic control in military operations has been amply demonstrated on the European battlefields.[1] In the African theaters that control has been still more pronounced, though exercised in a different manner. In Europe topographic detail has played a dominant part. In Africa, where man sinks to insignificance by the side of nature, the influence of climatic circumstances and of the vegetative covering of the land has been supreme.

The African campaigns have been conducted under tropical or subtropical conditions in lands still primitive. Into the wilderness war has carried exotic products of modern civilization; it has utilized the old and barbarous with the new and highly developed. A railroad runs through uninhabited tropical forest; motor trucks performing extraordinary feats over broken surfaces and through wastes of sand or mud supplement the native porter. The native guide is replaced by airplane, the strange "bird" that with the terrible new kind of "hippopotamus," the armored car, works havoc with the morale of the native forces. In those regions that are still the paradise of the mighty hunter the wild life furnishes foes not to be despised. The despatch rider abandons his motor cycle before the hippopotamus; General Smuts in his automobile is besieged by lions; giraffes entangle their long necks in the telegraph wires. Everywhere primitive forces have proved strong. Against them the elaborated tactics employed on the European fronts have failed hopelessly. In the African struggles vast areas have been covered by comparatively small bodies of men moving rapidly, and their ability to cover them has depended on the knowledge of the pioneer and on the bushman's art—of traveling without transport, of

[1] D. W. Johnson: Topography and Strategy in the War, Henry Holt & Co., New York, 1917. Many of the chapters published in revised form in this book had previously appeared in the *Bull. Amer. Geogr. Soc.* and the *Geogr. Rev.*

making long forced marches, and of living for days on next to nothing. This explains the phenomenal successes of Botha and Smuts, great leaders with a native experience finely sharpened in the guerrilla operations of the Boer War.

Not the least interesting feature of the campaigns is the part that has been played by the native tribes. The loyalty and ready assistance of many pay tribute to the character of British and French colonial rule. Among the particular instances testifying to happy administration is the effort of the Mossis, the people of a little kingdom in the Niger bend under French protection. They promptly raised a volunteer contingent that acted with effect and with much pride and pleasure in the occupation of northern Togoland.[2] Of the relations between the colonial Germans and the natives it is not easy to speak, but the lot of the German East African porter seems to have been a singularly hard one even in this hard land.

FIG. 1—General map showing the location of the German colonies in Africa. Scale, 1:64,000,000.

As a demonstration of the value of sea power the campaigns have yet another interest: especially is this the case in the conquest of German Southwest Africa. In the *Geographical Review* for June, 1916, some of the broad features of the campaigns were outlined by Cyrus C. Adams in the article "The African Colonies of Germany and the War." The campaigns will here be discussed in greater detail, each colony being considered separately in the order of conquest.

TOGOLAND

This little colony has heretofore been pointed out with pride as the "pattern tropical protectorate." Of Germany's four African possessions

[2] La conquête du Togoland: L'action des partisans mossis, *Renseign. Colon.* (*Suppl. à L'Afrique Française*), 1915, No. 4, pp. 49-55.

it was the only one not subventioned and at the outbreak of the war was in a flourishing condition. Togoland occupies a narrow strip between the Gold Coast and Dahomey. The area is only 33,600 square miles: small size and the limitations incident thereto constitute the controlling factor in this campaign. At the commencement of hostilities in Europe the governor of Togoland made proposals of neutrality to the governors of the adjacent French and British colonies. Naturally his propositions were rejected, and he was shortly called upon to surrender. A lengthy resistance was obviously out of the question, but there existed a definite reason for delaying the Allied occupation as long as possible. The German government had just completed the installation of a powerful wireless station at Kamina. This station could communicate directly with Berlin, and, with the stations at Windhuk in German Southwest Africa and Dar-es-Salaam in German East Africa, it formed a triangle able to control the seas of the southern half of the continent.

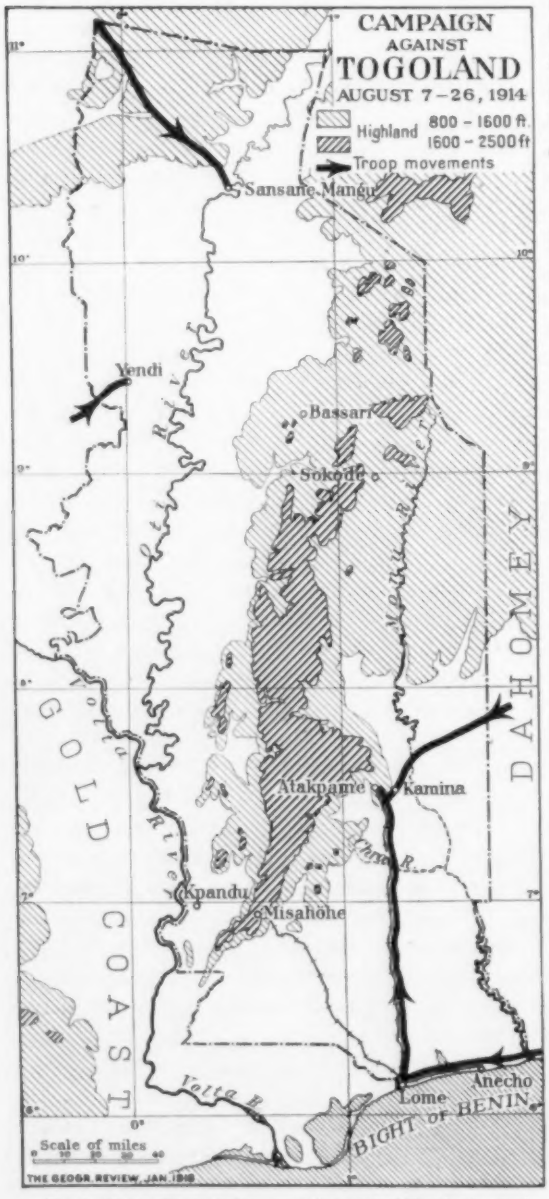

FIG. 2—Map to illustrate the campaign against Togoland. Scale, 1:3,500,000.

The general plan of campaign in Togoland,

as in German Southwest Africa and the Cameroons, consisted in the occupation of the seaboard, the establishment there of the major base of operations, and the simultaneous penetration inward of columns directed from points on the frontiers. In Togoland the German forces had at first been concentrated upon Lome, the principal port. As soon as Great Britain declared war on Germany they were removed inland for concentration on Kamina, the chief strategic site on the southeastern edge of the highland belt that traverses the country from north-northeast to south-southwest. The British occupied Lome without opposition and there were joined by the French coming along the coast plain from Dahomey; thence the Allied column turned inland to cross the coast plain to Kamina. On the coast plain, especially known as an oil-palm region, and the adjacent highlands the major part of the German government's developmental efforts have been expended. The region is served by three lines of railroad: a line of 74 miles from Lome to the southwestern corner of the highland area; a line of 27 miles from Lome along the coast to a point near the French frontier; and a line of 100 miles to Atakpame, near Kamina and one of the chief towns of the interior. This last-named line greatly facilitated the defense. The Germans retreated along it, tearing up the track and destroying bridges where time permitted. The Allied forces repaired and used the railroad and also used the road through the scrub; but the two lines are some distance apart, and co-ordination of movements was rendered difficult by the character of the vegetation. Apparently the original forest cover of the plain has been removed by native agriculturists, and its place is now occupied by scrub of a type recalling the maqui of the Mediterranean or the chaparral of California and western Mexico. During the long dry season drought is severe; indeed, it has been found necessary to establish wells and reservoirs along the railroad. On the coast, with mean temperatures of over 80° F., the rainfall of the four months November to February amounts to about 2½ inches only. After the major rainy season, that is from April to June, swamps remain and tall grasses flourish. Lacking good positions and observation posts such ground is unsuitable for artillery operations; but it is excellent for defense. Actually the defense made no serious stand save at the strong position on the Chra River, where they delayed the offensive by destruction of the important bridge.

Meanwhile the northern part of the colony had been occupied by the Allies with but little opposition. Northern Togoland lies in a natural region entirely distinct from that of the south, with which its relations have been comparatively slight. The northern country is beyond the area of effective German occupation. Its affiliations are with the Sudan and the Desert; its trade is exclusively in the hands of Mohammedan Sudanese merchants, and such as reaches the coast does so chiefly and naturally through the Gold Coast. The main opposition encountered in the northern plains was that arising from climatic conditions. August, the month of the

campaign, marks the height of the single rainy season of this latitude. Sokode, for example, out of a total annual rainfall of 51 inches, has over 12 inches in this month. Yet in spite of continuous rains and inundated country the northern column covered 370 miles in 20 days. With the occupation of Sansane-Mangu by the northern (French) column and of Yendi by a British column from the west the subjugation of northern Togoland was assured.

About the same time, that is three weeks from the occupation of Lome, the main column from the south and the French column from the east arrived simultaneously before Kamina and received the capitulation of the colony.

German Southwest Africa

In this campaign the British forces acted alone. Angola bounds German Southwest Africa on the north, but Portugal did not join the Allies until some months after the conquest of the colony. The prime interest of the campaign lies in its triumph over one of the most difficult of physical obstacles—the barrier of the desert.

Practically all of the 322,440 square miles of Southwest Africa are arid or semi-arid. On the most exposed frontiers—the coast and the southern and southeastern borders—the aridity is greatest. The coast desert of the Namib, ranging in width from 15 to 85 miles, has only 4 inches of rain a year on its more favored eastern margin; the desert ports have under 1 inch. The stony plateaus of the southern portion of Great Namaqualand also have very little rain. Towards the north the rainfall increases. The heights encircling Windhuk, over 6,500 feet (2,000 meters) high, are comparatively favored; but it is only in the extreme northeast of the colony that 20 inches falls over a significant area. In the absolute desert of the Namib pasture is entirely lacking, and water can be obtained only from wells sunk in the river beds, dry on the surface for years at a stretch. Over the southern interior pasture of sorts is fairly generally distributed, but the water supply is scant and sharply localized. The happy combination of pasture and water is of none too frequent occurrence.

In proportion to the strength of the desert barrier is the value of the railroad. The military necessity of such an artery was admirably shown in the Peruvo-Chilean War of 1879-83, the campaigns of which were carried out in an area physically analogous to Southwest Africa. Today Chile is just completing her great strategic railroad from the populous centers of the south to the northern limit of the nitrate fields; for 900 miles the line runs through desert country. A like problem is being created by the opening up of northern Africa. In the plans for the development of her African territory France has recognized the strategic as well as economic value of the Trans-Saharan railroad.[3] In Southwest Africa the railroad formed one

[3] Evans Lewin: Railways in Africa, *United Empire*, Vol. 8, N. S., 1917, pp. 23-30, 94-99, and 172-178; reference on pp. 23-30.

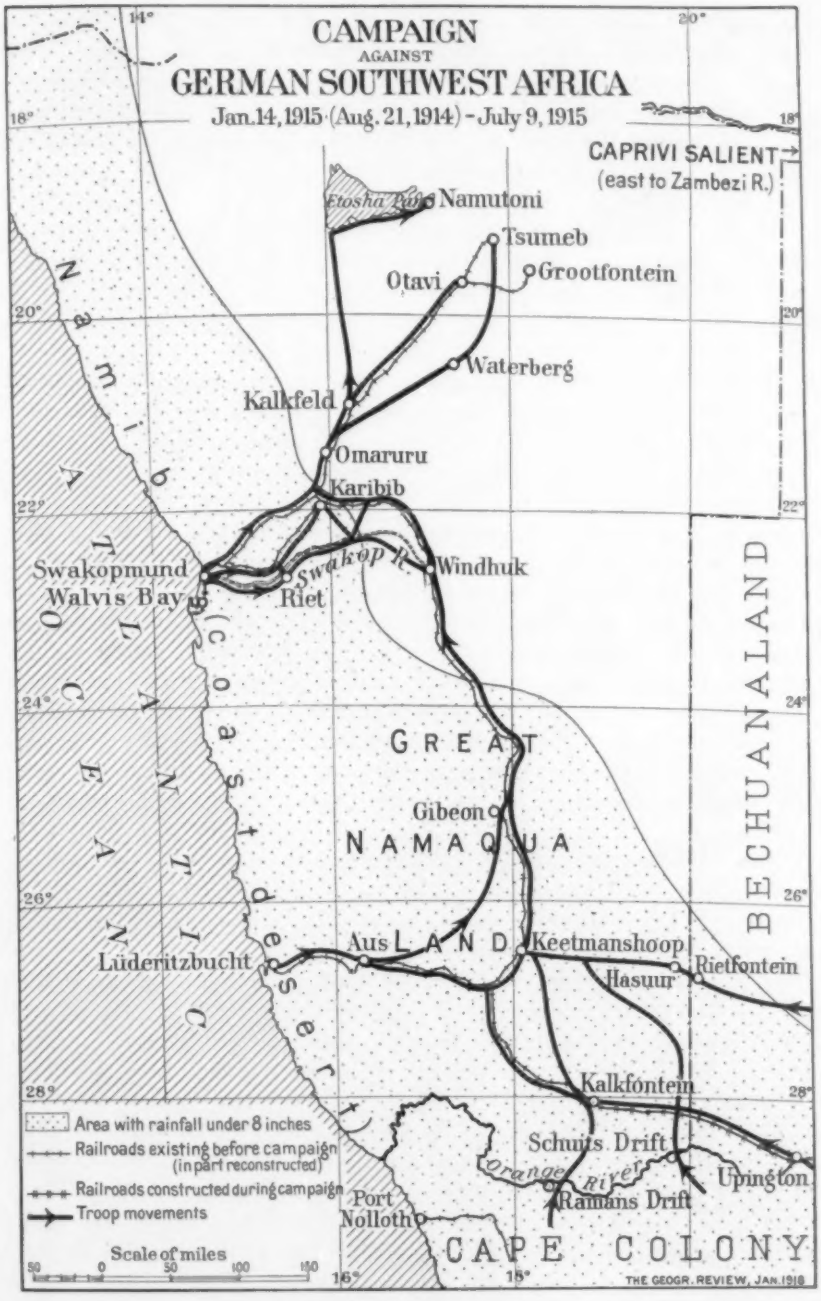

FIG. 3—Map to illustrate the campaign against German Southwest Africa. Scale, 1:7,750,000.

of the major defensive works upon which the Germans employed themselves so assiduously from the conclusion of the Herero War, 1904-05. The present system incorporates a dorsal railroad from Otavi and its branches in the north to Kalkfontein in the south; lateral branches connect with the coast at Swakopmund, the port for Windhuk, and Lüderitzbucht, the port of the diamond fields. At the beginning of the war about 1,300 miles of line were in operation. Of this only the Otavi line serving the copper mines of the north was paying expenses; the value of the system was strategic. Since the beginning of the campaign the Southwest African system has been connected with that of the Union of South Africa by a line from Upington on the Orange River to Kalkfontein, the southern terminus of the German system.[4]

In the Peruvo-Chilean war the first step towards conquest of the desert lay in securing control of the sea highway of communication. When the Peruvian fleet had been defeated, Chile gained the seaboard, and the fate of the campaign was decided. In the Southwest African desert control of the seaboard was likewise of vital importance. It was essential that Swakopmund and Lüderitzbucht should be occupied as bases and the sea highway to the Cape be maintained. Apart from retaliation to the German attack on the Orange River and the subsequent unfortunate affair of outposts, the first British move was to recapture Walvis Bay, seized by the enemy on the declaration of hostilities, and to occupy Lüderitzbucht. Before further advantage could be taken operations were, however, suspended for a time. The revolution within the Union successfully stimulated by Germany in the main accounted for the delay, but a contributory cause was the temporary disturbance of British sea power occasioned by von Spee's attack off Chile. The battle of the Falklands was necessary to restore confidence in the southern seas.

The real offensive against the colony began early in 1915. A northern and major column under General Botha started from Walvis Bay and Swakopmund. In the south three main columns invaded the colony simultaneously; one proceeded from Lüderitzbucht, and another, in three sections, from the Orange River. The third, having Kimberley as base, crossed the Kalahari Desert and entered German territory from Rietfontein. These three columns planned to unite at some point on the railroad near the junction of Keetmanshoop, thence to proceed on Windhuk from the south as Botha's column advanced from the west.

The hardships of the northern column began with the landing at Walvis Bay, of which the personal narratives paint unattractive pictures. The natural harbor is excellent, but landing facilities were undeveloped. All other native resources are lacking, and the climate is peculiarly disagreeable. The order of the day was "humidity, fog, and cold each morning,

[4] *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, p. 879.

atrocious wind every afternoon and evening.''[5] Although situated within the tropics this portion of the coast is swept by the cold Benguela Current, which, like the Humboldt Current on the corresponding shores of South America, lowers the temperature and is in part responsible for the characteristic fog belt that hangs over these coasts. Although the air is humid, rain is practically unknown, and except on rare occasions the river beds are dry. An unusual phenomenon that might have been regarded as a happy augury greeted the arrival of the commander in chief; the Swakop River came down in flood and flowed for a day after Botha's entry into Swakopmund. It was the first time for some fifteen years that the river had reached the sea, and it swept away the railroad built across the flats of the river mouth. But the flood was hailed as a promise of unusually favorable conditions in a region where the water supply is the ever-present question. From their landing the forces were faced by this question. Walvis Bay is absolutely dependent for its water on sea-water distilleries of limited capacity, and at first water had to be brought from the Cape, 800 miles away. On the march inland the troops mainly depended on the water holes in the Swakop River. The holes and wells, carefully charted on the maps, are generally nuclei of tiny settlements. Round the most important of them was fought the sharpest and most decisive action of the campaign—the Pforte-Riet-Jakalswater engagement. Advance was made up the river bed and by the reconstructed railroads. Across the desert belt impediment to transport was peculiarly great, the highly micaceous sand causing wheeled vehicles the greatest trouble. Success indeed depended on the mobile army's ability to surmount difficulties of transport. Arid sand and bare rock contributed a curious feature to the campaign. The blasting necessary in sinking for water requires the use of enormous quantities of explosives; every farm had its own stock of dynamite. The German forces could thus draw on vast stores, and they took full advantage of their opportunity. The degree to which the roads were mined is a marvel only exceeded by the singular failure of the scheme.

The difficulties of the northern column were fully shared by their cooperators in the south. They, too, faced lack of water, poisoned wells, scant grass, and absence of native resources. Even the cattle had been moved from the grazing grounds. In one instance the force crossing the Kalahari on its 600-mile march from Kimberley found itself 120 miles from the next water site. The problem of supply was solved by establishing two intermediate stations to which water could be carried by motor over these 40-mile jumps. The column from Lüderitzbucht had the advantage of the railroad, but even the iron line has to pay the toll of the desert. In the Grasplatz section of traveling dunes some hundreds of laborers must be kept constantly

[5] P. A. Bridel: Notes sur la campagne du sud-ouest Africain, *Bibliothèque Universelle et Revue Suisse*, Vol. 82, Lausanne, 1916.

employed clearing the line, an item of upkeep said to have cost the German government about $50,000 a year.

The three southern columns met as planned near Keetmanshoop, and the enemy began their retreat on Windhuk, clinging to the railroad and tearing up the line as they went. To save the line and hasten the retreat or cut off the enemy the pursuers made a tactical move involving one of the chief engagements of the campaign. A flying column, traveling without transport, cut across the desert, intercepting a part of the German force at Gibeon. Thence the remaining enemy fled full speed to Windhuk.

Windhuk, the capital of the colony, capitulated to the northern column on May 12, 1915. From here the final stage in the campaign was developed in characteristic fashion. A frontal line of attack followed the northern railroad. Two important flanking columns co-operated. One, to the right, skirted the Waterberg escarpment, cut the southern fork of the railroad, and occupied Tsumeb. This column covered 300 miles in 15 days. The left column made a still greater detour, striking north through country almost entirely devoid of grass and water and covering 350 miles in 13 days. After skirting the Etosha Pan the column closed on Tsumeb from the west. Thus the German force at Otavi was completely outflanked and finally surrendered on July 9. In the northern portion of the country, extensively covered with thorn bush, valuable reconnaissance service had been rendered by airplane. The airplane indeed was not unknown in Southwest Africa before the war. The German government had begun aëronautical experiments in the colony with both military and civil objects in view, and an experiment station had been erected in Karibib.[6]

The major operations carried out by the forces from the Cape had been supplemented early in the campaign by Rhodesian troops, who occupied the Caprivi finger, "that inconvenient salient" giving Germany access to the navigable waters of the Zambezi above the Victoria Falls. Altogether conquest was achieved with a loss of only twelve score lives. To secure possession of this territory Germany had previously paid heavily in money and human life. The Herero War alone cost a sum approximating a hundred million dollars, required the services of thousands of troops from overseas, and wiped out the greater part of a numerous tribe.

The Cameroons[7]

The geographic and strategic center of this territory of 191,130 square miles is the central plateau of Ngaundere and its westward continuation, known under a variety of names, to Banyo. The average elevation of the

[6] Aviation in German Africa, *Commerce Repts.*, Sept. 18, 1914.

[7] In a recent letter to the *London Times* (*Literary Suppl.*, May 4, 1917) Sir Harry Johnston points out that the plural (The Cameroons) and not the singular form (Cameroon, Kamerun) is the correct version of this word, being derived from the name given in 1470 by its Portuguese discoverers to the Duala estuary (Rio dos Camarões; *camarões*, prawns, or shrimps) on account of the large number of prawns found in its brackish waters.

plateau is from 3,000 to 4,000 feet. It extends eastward practically to the frontier of French Equatorial Africa and westward is continued as a series of parallel ranges to which is aligned the Nigerian frontier. In the extreme southwest the highland terminates in the volcanic massif of Cameroons Mountain. Northward the central plateau drops sharply to the plains of Chad with island-like massifs continuing to within 100 miles of the lake. Southward the plateau sinks gently to the 1,500- to 2,000-foot level maintained in the southern Cameroons. It is bordered by a coastal zone 30 to 75 miles wide.

Two points on the borders of the central plateau are of prime importance in relation to it: Garua, the northern outpost in the fertile plains of the north, and Yaunde, the southern post on the edge of the unbroken tropical forest that stretches from this station to the littoral. The savana country of the plateau and northern plains, with a distinctly dry winter season, is generally healthful. The coast plain, the oil-palm region *par excellence,* and the seaward slopes of the plateau, hot, moist, and characterized by very heavy rainfall, have an ill fame as one of the most unhealthful parts of Africa. The rainfall record of Bibundi, on the Cameroons Mountain, 355 inches (9 meters), is surpassed only by the extraordinary rainfalls registered in Assam. The coast region of the Cameroons is notoriously a habitat of the tse-tse fly; cattle cannot be raised, and sleeping sickness is rife.

For some years the forest barrier kept back German penetration. It began in 1887 with the establishment of the military post Yaunde, now one of the great route centers of the interior. Railroad construction later began to open up the coast plain. One line runs from Duala, the commercial capital at the head of the Bay of Cameroons, northward to the highlands; another follows the plain southeastward to a point beyond Edea on the Sanaga River.

The general plan of campaign in the Cameroons proceeded along lines similar to those adopted in Togoland and Southwest Africa. The seaboard was invested in September, 1914, and Duala, the chief port, established as a major base of operations. Minor bases on the coast were also created for the little flotillas that patrolled the navigable rivers. The Allied troops for the major column came by the sea highway, the force despatched from England picking up native reinforcements from the British West African possessions en route and meeting a French detachment at Lagos. Converging columns acted from the land frontiers. A British force from northern Nigeria co-operated with a French column from the Lake Chad territory. From French Equatorial Africa, where at the outset mastery was gained over the Congo-Ubangi route, columns penetrated by the east and southeast. Another force penetrated from the west by Coco Beach, the little port of that strip of coast south of the enclave of Spanish Guinea (Rio Muni).

From the main column in the south a division was detached to secure the northern frontier of Nigeria. It obtained possession of the Cameroons

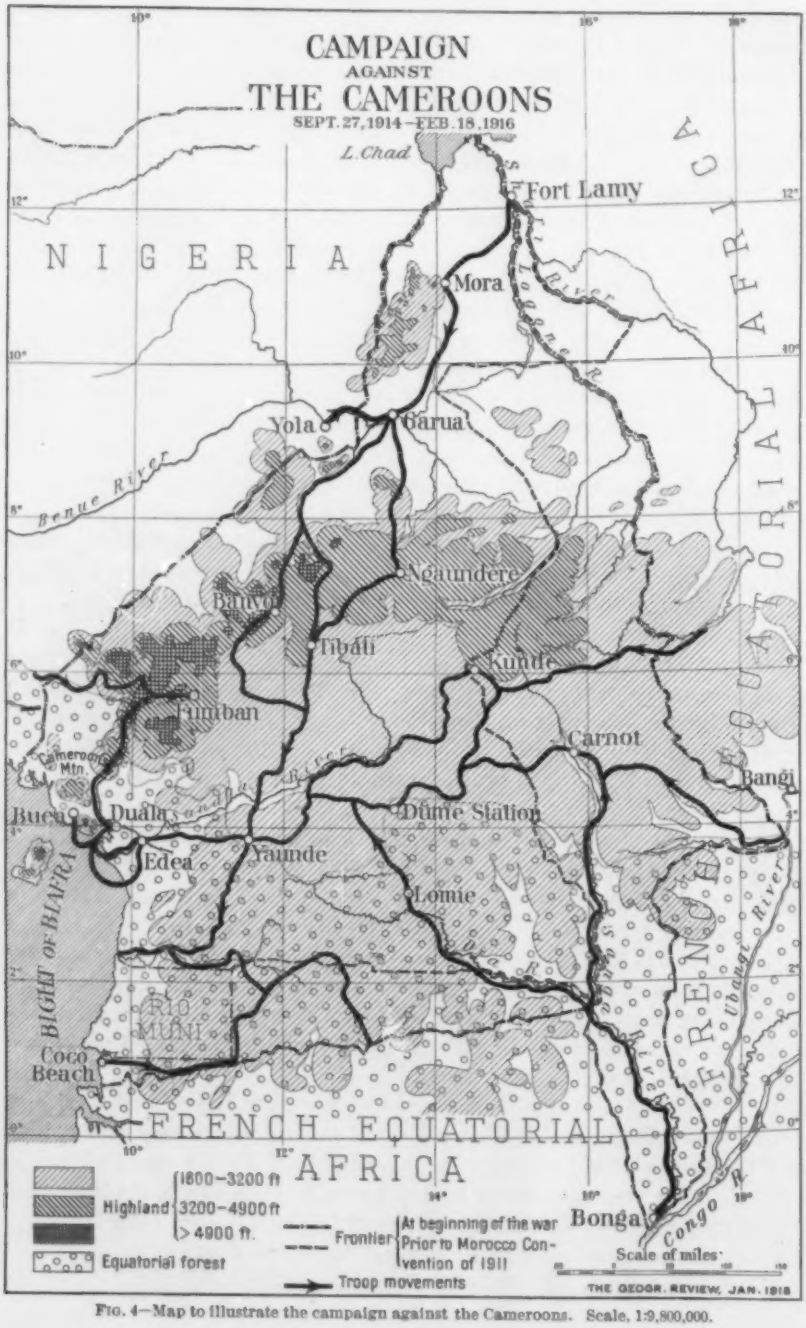

FIG. 4—Map to illustrate the campaign against the Cameroons. Scale, 1:9,800,000.

Mountain region, with the administrative town of Buea and after an initial reverse, the northern railroad. The main column was directed on Yaunde. Here, in the face of supreme difficulties of transport, progress was slow. Reconstruction of the railroad to Edea and the building of roads materially improved the situation, yet in the main convoys were dependent on native paths and native carriers. Over 7,000 carriers were employed, most of whom came in monthly detachments from Sierra Leone, Nigeria, and the Gold Coast. But the season of heavy rains, May to September, suspended all operations. The great offensive did not begin in fact until the approach of the little dry season towards the end of October (1915).

Action advanced more rapidly in the north. The early British attack on Garua failed. The strength of the fort had been underestimated, heavy August rains flooded the country, and the attacking force was compelled to retire on Yola. In January, 1915, after the subsidence of the floods British and French forces united before Garua to assault again the northern key to the plateau. Garua, the center of a splendid agricultural and grazing district, stands on a hill overlooking the Benue River, here navigable for large barges. The strength of its defenses might well have been taken as a measure of its importance. On them some thousands of laborers had been engaged for several months. The fort held out until June; the chief factor in its capitulation appears to have been the mutiny of the native soldiery, terrorized by the besieger's artillery fire, especially by the execution of the French 95-centimeter gun.[8]

With the fall of Garua the way to the plateau was open and the Allied column made rapid advance southward. Their work approached completion with the taking of Ngaundere. Ngaundere is on the edge of the fertile agricultural land of the north. South of it begins the "equatorial poverty with its sole and never-ending resource, manioc; its vegetation so dense, so puissant, so useless; its population successively more barbarous and scant in number; its harbingers of the tse-tse fly announcing the fate that awaits the unhappy inhabitants."[9] The steep ascents to Ngaundere had been strongly fortified, but on this occasion climatic phenomena came to the assistance of the attackers. A violent tornado, unusual at the height of the rainy season, flooded the trenches and drove out the defenders. A similar occurrence is also reported to have taken place at Banyo, another important plateau station, that, like Ngaundere, had been strongly fortified and amply provisioned with cattle and grain.

Meanwhile the columns in the east and southeast had been acting with zeal in a particularly difficult country. To their labors, however, was added the triumphal reoccupation of the African "Alsace-Lorraine." For in this light French Equatorial Africa regarded the 100,000 square miles of territory ceded to Germany by the Morocco Convention of 1911, whereby

[8] A plan of the defenses of Garua may be seen in *L'Afrique Française*, Oct.-Dec., 1915.
[9] La conquête du Cameroun septentrional, *L'Afrique Française*, Oct.-Dec., 1915, p. 288.

the colony gained access to the navigable waters of the Ubangi and the Congo. Where the waterways could be used unusually good lines of communication could be maintained, and the Belgian authorities supplemented French resources by putting their river steamers and artillery at the disposal of the column acting on the Sanga River. But penetration westward was made through scantily peopled forest country traversed only by native paths. Nevertheless the eastern and southeastern columns co-ordinated successfully with the other columns in the march on Yaunde. This last German defense they reached during the first week of January, 1916, a few days after the entry of the main column of the south. Successful as the co-ordination had been, the columns were unable to safeguard all routes of escape, and a large part of the enemy force slipped through into the neutral territory of Spanish Guinea. So ended a campaign aptly described as "amphibious in the widest sense."

German East Africa

German East Africa was by far the most important of Germany's colonial possessions. Occupying a central location and fronting the Indian Ocean the colony enjoyed a position strong both strategically and economically. Moreover to the natural defenses liberally bestowed upon the territory had been added elaborate military preparations. At the outbreak of hostilities the situation was highly favorable to the German colony.

German East Africa is a compact territory. With an area of 384,000 square miles it has frontiers 2,700 miles long and a distance from end to end of not over 700 miles. On the seaboard defense is favored by the character of the coastal plain, 10 to 30 miles wide in the north, broadening to the south—a zone of damp heat fringed on the littoral by mangrove swamps and clothed elsewhere by dense scrub. Tanga and Dar-es-Salaam, where railroads start for the interior, had been strongly fortified. The interior plateau with a general altitude of 3,000 to 4,000 feet presents very diversified topography along the inland frontiers, especially those of the north and northwest. The volcanic mass of Kilimanjaro rises to 19,700 feet; the Soda Lakes of the eastern rift valley west of Kilimanjaro lie at an elevation of about 2,000 feet. Between Kilimanjaro and Victoria Nyanza the Anglo-German boundary, purely artificial, lay in a frontier zone defended by its aridity and inaccessibility. The lakes of the western rift valley—Kivu and Tanganyika and the connecting stream—defined a natural boundary, as did Lake Nyasa to the southwest. On this last lake and on Victoria Nyanza supremacy was held by the British, but on Tanganyika the Germans with four armed vessels to one Belgian boat held the advantage of 400 miles of easy communication.

On all the fronts except the northeastern the Allies suffered from the remoteness of their bases. The Belgian forces from their base in Boma had to traverse the entire Congo territory. The rail and steamer route via

Stanleyville to Albertville, completed in March, 1915, proved invaluable, but transport to Kivu and the northwest frontier entailed a long service of caravan and porter. From the Rhodesian front the nearest point on the railroad was distant 400 miles. Against these difficulties sustained by the Allies stand in contrast the shortness and general superiority of the German

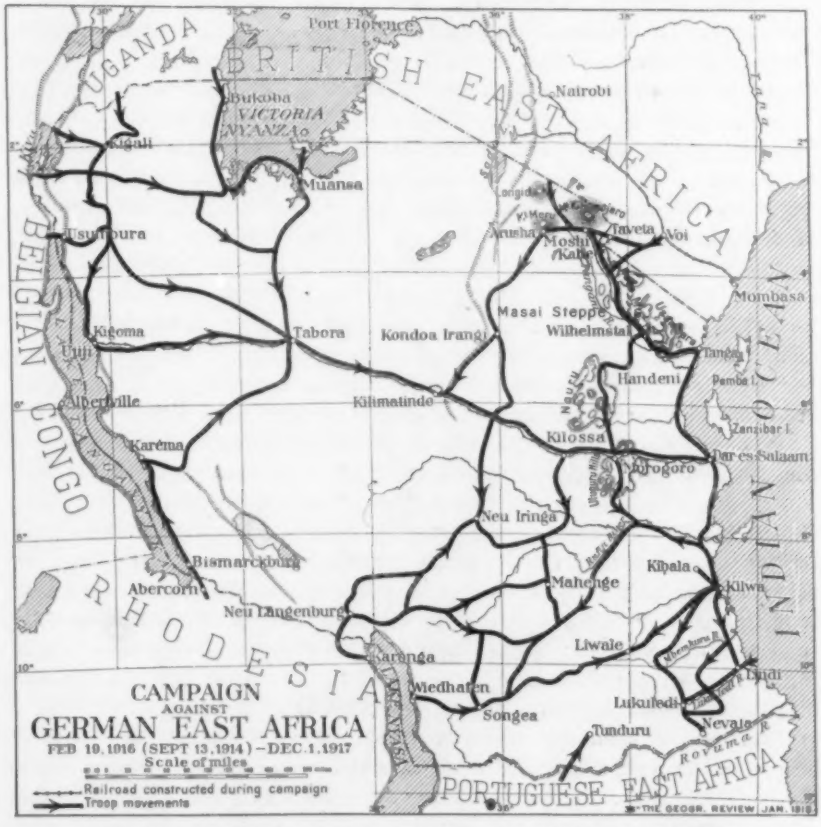

FIG. 5—Map to illustrate the campaign against German East Africa. Scale, 1:8,750,000.

lines of communication. The German section of the trans-African steam route was completed to Tanganyika (Kigoma) in 1914.[10] It follows an ancient highway, the old caravan road of the Arab traders in slaves and ivory. On it stands Tabora, one of their settlements, then as now the strategic center of the plateau and a crossing point of roads east and west, north and south. From Tabora the German government had also constructed several good roads, including two to Muansa, their principal port on Victoria Nyanza. Besides the central railroad a line connected the coast

[10] Completion of the Tanganyika Railroad, *Bull. Amer. Geogr. Soc.*, Vol. 46, 1914, p. 288.

with the beautiful and healthful Usambara Highlands, the only part of the colony where white settlement had made any considerable headway.

Of the many "fronts" along these diversified frontiers that of Kilimanjaro, because of its relation to the Usambara Highlands and its comparative accessibility, claimed by far the greatest strategic interest. On the German side the northern railroad permits easy transportation between Tanga and Moshi; on the British side is the Uganda railroad, here paralleling the frontier and not more than 50 miles from it in a straight line. At the outbreak of hostilities there were only 1,200 troops all told in British East Africa. In the German colony were about thirty times as many, with a large proportion of them massed on the Kilimanjaro front. The German forces used their advantage to make several happily unfruitful raids at various points on the Uganda line. One of the first attempts affords a certain ironical amusement. The invaders, using their own excellent maps, arrived within 20 miles of the railroad, when, being forced to depend on inferior British cartography, they lost themselves in the waterless bush to be picked up dying of thirst by a British patrol! The major enemy operations, however, were confined to the road between Taveta and Moshi, waterless indeed for long stretches but nevertheless the most practical inland route between the territories of British and German East Africa.

Among the most important British operations in 1915 was the blockade of the coast. Although the use of Zanzibar and Pemba as a base in such operations is perhaps only a poor consolation for lost Heligoland, the dearly bought islands simplified somewhat the difficult problem of the blockade of 600 miles of coast. As it was, the blockade was forced by two supply ships, and at the end of her adventurous career the *Königsberg* succeeded in escaping to the Rufiji River, where she was finally located and destroyed, not however before her guns had been removed for use in the interior. It is interesting to note that the destruction of the *Königsberg* occasioned the first use of the seaplane in the directing of gunfire.[11]

The coast also was the scene of the early and unfortunate attack on Tanga. Here as in similar attempts elsewhere the enemy strength had been underestimated and the natural defenses likewise unappreciated. The attacking forces, dispersed in the almost impenetrable scrub of the coast plain, fell victims to well-planned ambuscades. Not the least of their troubles—strange as it may sound to those thinking in terms of the temperate zone campaigns—came from the wild bee, so prolific here as to be a formidable foe.

During the first year of the war the Allied forces were on the defensive on all the fronts. In British East Africa the Germans occupied a section extending beyond Taveta, and on several occasions Nairobi, the administrative center, had been threatened. Until the beginning of 1916 the campaign

[11] See Henry Woodhouse: Textbook of Naval Aeronautics, New York, 1917. On p. 113 is an aërial snapshot of the *Königsberg* lying in the Rufiji.

awaited more troops and different tactics. The greater part of the German East African plateau is covered by savana, grass steppe, or scrub ranging from the waterless thorny acacia bush at the base of Kilimanjaro to the well-grassed and wooded hills of the Ruanda cattle country. In such country the tactics of the European theaters inevitably failed; here as elsewhere in the African campaigns was there need for the bushman's art. A successful offensive began only with the arrival of General Smuts to take over the command. By this time (February, 1916) the British forces had been raised to over 40,000, while in the Belgian Congo had been accomplished the remarkable feat of raising an army of 20,000 well-disciplined and devoted soldiers, possessing the supreme virtue of "knowing how to live on nothing."[12]

The solitary mountain is a natural feature peculiarly impressive. To the savage it appears as an object of awe and worship, nor do the civilized escape its spell. When Rebmann, the discoverer of Kilimanjaro, first looked upon that mountain he fell to his knees reciting a psalm of praise. Little wonder that the white-crowned "monarch of African mountains" is enshrined in native tradition: "who possesses the mountain will rule the country." Kilimanjaro lends a prestige invaluable in a field where military success rests on native help. But beyond its worth as a moral asset and beyond the economic value of its fertile slopes it occupies a strategic position; Kilimanjaro is the key to the campaign in German East Africa. When General Smuts arrived in East Africa he immediately began the vigorous offensive that in a few weeks put this key into British hands. The need for prompt action was imperative. The season of heavy rains, March to May, was impending, and in the Kilimanjaro region the rains are true equatorial torrents. Then the black soil, of a nature similar to the black "cotton" soil of India, becomes a spongy slough, and transportation is virtually at an end.

The principal action took place in the gap between Kilimanjaro and the Pare Mountains against an excellent German position. The broken foothills of the great mountain protected the enemy's left flank; swamps defended the right; two roads afforded communication with the railroad in the rear. Taveta was the main objective of the British forces advancing through the thick bush of the Serengeti plain. The regaining of this station—Taveta is on the British side of the frontier—opened up the roads into German territory. By the one Moshi was reached. Here the forces from the east met the minor column that had secured the western slopes of the mountain from Longido. By the other and inferior road the railway

[12] Since the beginning of the war the Belgian Congo has also witnessed a great economic development. Exports in 1914 amounted to 53,000,000 francs, in 1916 to 129,000,000. In 1916 were supplied to the munition plants of the Allies over 22,000 tons of palm nuts, nearly 4,000 tons of palm oil, and 3,000 tons of rubber. The estimated production of metal from the Katanga copper mines for 1917 is 30,000 tons, nearly three times as much as in 1914. Over 1,000 miles of telegraph wire have been laid, railroad construction continues, and river craft is continuously being augmented from the shipyard established at Havre for this purpose. (Cable received by the Belgian legation in Oct., 1917, and communicated to this Society.)

was cut at Kahe; along this road was promptly extended a branch line from the Uganda railway at Voi, which relieved the burden of transportation from the Mombasa base. Conquest of the Kilimanjaro area was completed.

No doubt had ever existed in regard to the first step in the campaign; as to subsequent procedure several possibilities lay before the commander-in-chief. The Usambara Highlands offered the great prize of the campaign; the larger part of the white population was concentrated here, and here were flourishing plantations—coffee, banana, tobacco, with rubber and sisal on the eastern lowlands. The value of exports from Tanga greatly exceeded that from any other port in the colony. But the highlands were too well defended. The Tanga disaster had made clear the difficulties of an eastern approach. On the west the mountains descend precipitously to the broad belt of thick bush that separates them from the swift Pangani River, impassable at most points and everywhere pestilential. Concentration of the German forces in the highlands made any attempt on them unfeasible at this juncture. Penetration by Dar-es-Salaam was ruled out largely on climatic grounds. Immediately after the rainy season the malaria-haunted coast is in its most unsalubrious state and hence was likely to prove particularly disastrous to a force two-thirds of which was white. Moreover, during the cooler months, April to October, the southeast trade wind that blows variably with the southwest monsoon and at times is developed with great force renders landing an arduous and even impossible performance. Belgian operations on the northwest needed only the support of a comparatively small British column. For the major forces there remained an attempt to strike south from Kilimanjaro into the heart of the country. Strategically this plan had much to commend itself. Such a move would separate the chief German army in Usambara from Tabora and the northwest and the enemy's principal resources in men and cattle—Ruanda province is estimated to contain 2,000,000 natives and 2,500,000 head of cattle. To avoid such a contingency forces would be drawn from Usambara and the highlands thus laid open to attack. The strategy proved successful. A mounted column from Arusha skirted the western edge of the arid Masai Steppe, occupying in succession the stations where springs issue from the scarp that defines this edge of the steppe. Unfortunately the heavy rains in this region had prevailed unusually late. By the time that Kondoa-Irangi had been reached malaria had seriously depleted the fighting force, their 200-mile line of communication was a continuous quagmire, and the tse-tse fly had carried off half their horses. Yet the column under its Africander chief continued to press forward and succeeded in cutting the central railroad at three points, securing it from Kilimatinde to Kilossa. About the same time the eastern column, that had fought its way through the wooded maze of the Nguru Hills via Handeni, reached the railroad at Morogoro. Already Usambara, with its defensive force weakened, had fallen under attacks from the interior and

the coast. Coast towns from Tanga south fell in a sequence culminating with the capitulation of Dar-es-Salaam in September.

While these actions were taking place in the east columns in the north and west were converging on the central stronghold of Tabora. The British column had secured a valuable base in the German lake port of Muansa whence good roads run south to Tabora. Belgian columns advanced via Kigali, the capital of Ruanda, round the wild volcanic desert north of Lake Kivu and also to the south of the lake. Earlier in the year several British gun-boats brought overland from Cape Town to Lake Tanganyika had obtained command of the lake and co-operated with land forces in the occupation of the lake ports. Completion of this work released another Belgian column for the march on Tabora. Tabora fell shortly after the capitulation of Dar-es-Salaam and with it the entire country north of the central railroad passed into the possession of the Allies.

Driven from the north the German forces took refuge in the lower Rufiji valley and the Mahenge plateau. To the former the main body of the enemy retreated from Morogoro through the Uluguru Hills, where for the first half of the way they had the advantage of a partially constructed military road. Close pursuit, however, did not leave them long in possession of the Rufiji, though indeed it is difficult to see how a considerable force could have been long maintained in this most undesirable region. During and immediately following the rains the Rufiji is notoriously unhealthful even for German East Africa. In the dry season water is scarce or absolutely lacking over great stretches. The precariousness of the water supply and the limited food resources are reflected in the scant native population. In contrast, and especially in point of healthfulness for the European, the Mahenge plateau offers decided advantages, and for this reason it was adopted as the enemy headquarters during the succeeding rainy season.

While the extent and varied topography of the southern portion of German East Africa result in a varying distribution of rainfall, the rainy season of the south as a whole may be said to coincide with the "summer" months, November or December to April, earlier in the interior than on the coast.[13] Here, as in the north, the torrential nature of the rains seriously impedes or altogether prevents military operations. Moreover the rainy season of 1916-17 was remarkable for its intensity and long duration, and little activity could be displayed until the end of May, when the general offensive in the south may be said to have begun.

Even more than the campaign in the north has the southern campaign been controlled by the peculiar natural difficulties of the country. Compared with the north the south has been very little developed. Except for the rubber, sisal, and cotton plantations of the Kilwa-Lindi coast lands and the coffee fields of the well-watered slopes at the north end of Lake Nyasa, European cultivation appears only at one or two administrative centers of

[13] For a note on the climate of German East Africa see the "Geographical Record" in this number.

the southern interior. The native population is far inferior in numbers to that of the north. According to figures for 1913 the density per square mile is 1.6 for the administrative districts of Songea and Kilwa and 1.3 for Iringa. In contrast Ruanda, the great recruiting ground for the *askaris*, containing over 25 per cent of the native population of German East Africa, has the surprising density of 72 to the square mile.[14] The broken country of the south, waterless over considerable stretches, covered for the most part with a "dry-forest" of spiny acacias and like drought-resisting trees and bushes, favors guerrilla warfare at the expense of clean and rapid subjection of the enemy. Its conquest was no light task. The Allied forces planned to accomplish it by the establishment of a cordon around the now scattered enemy groups, and this plan involved the co-operation of numerous columns. Belgian forces that had pressed on after the fall of Tabora invested the Mahenge area from the north. Farther east was the British column pressing on the Rufiji River, where it had been supported by other British troops, mostly Indian or native African (Nigerian) from the delta, and similar attacks from the coast were directed from Kilwa and Lindi. The Portuguese became active on the Rovuma frontier, but the chief action devolved on the Rhodesian-Nyasaland forces, which already during the northern operations had penetrated into German territory along several lines. Of the geographical and military relations in their sphere by far the most striking pertain to the problems of transportation. The Rhodesians received their supplies by two extraordinary routes. The one from the base of Salisbury involved 600 miles of railroad and 400 miles of highway, now improved to admit of motor lorry, though at first only practicable for porter service, the use of transport beasts being restricted by the occurrence of the tse-tse. The alternative route was characterized by frequent transhipments: from Durban by sea to Beira and thence to Chindi; by river steamer up the Zambezi to Chindio; by the Shirè Highlands railroad to rail head; by road to Fort Johnston on Lake Nyasa; by lake steamer to Karonga; and finally by carrier or motor lorry to Abercorn near the southern end of Lake Tanganyika. The problem of supply was rendered still more difficult by the scant native resources of this undeveloped country.

The story of the southern campaign is that of the gradual tightening of the Allied cordon, combined with the isolation and capture of the scattered detachments. Mahenge fell to the Belgians, and the enemy in this district was then cut off from the southeastern valleys. In the coast hinterland he was pushed successively southward, from the Kilwa district to the Mbemkuru valley and thence to the Lukuledi, where to the east of the Lukuledi Mission the last stand was made. A small detachment is reported to have sought refuge in Portuguese territory, but German East Africa is now, December 1, 1917, in undisputed possession of the Allies, Belgium and Britain.

[14] *Bull. Imperial Inst.*, Vol. 12, 1914, p. 582. See also the map of population density in Meyer: Das Deutsche Kolonialreich, Vol. 1, p. 80.

Bibliography

The Military Operations

In the preparation of this article use has been made of the official despatches appearing in the *London Gazette* and of material in contemporary issues of the *London Times* (Weekly Edition), *L'Afrique Française*, the *Journal of the African Society*, and the *United Empire Magazine*. The more important items include:

Report on Operations in the Cameroons, *London Gazette*, May 30, 1916.

Report on Operations in German East Africa, *London Gazette*, January 16, 1917. [Translations in *Renseign. Colon.* (*Suppl. à l'Afrique Française*), July, 1916, pp. 199-209, and April, 1917, pp. 94-104.]

Report on Operations in German East Africa, *London Gazette*, July 13, 1917, and September —, 1917.

La conquête du Togoland, *Renseign. Colon.* (*Suppl. à l'Afrique Française*), May, 1915, pp. 82-102.

La conquête du Cameroun septentrional, *l'Afrique Française*, Oct.-Dec., 1915, pp. 279-289.

La conquête du Cameroun: La colonne du nord, *ibid.*, April, 1916, pp. 109-123.

Henri Mailier: Le rôle des colonnes françaises dans la campagne du Cameroun, *L'Afrique Française*, June, 1916, pp. 187-225.

W. B. Worsfold: The Taking of German South-West Africa, *United Empire*, Vol. 6, N. S., 1915, pp. 747-751.

Sir Maitland Park: German South-West African Campaign, *Journ. African Soc.*, Vol. 15, 1916, pp. 113-132.

J. J. O'Sullevan: Campaign on German East Africa-Rhodesian Border, *Journ. African Soc.*, Vol. 15, 1916, pp. 209-215.

The Belgian Campaigns in the Cameroons and in German East Africa. From information supplied by the Belgian Minister for the Colonies. London, 1917.

Other important articles on the German East African campaign are:

Charles Stiénon: L'Effrondrement colonial de l'Allemagne, *Revue des Deux Mondes*, April 1, 1917.

The Campaign in East Africa, *Journ. Roy. United Service Inst.*, May, 1917.

Col. Echagüe: La campaña colonial de los aliados, in "La Guerra y su Preparación," Madrid, Vol. 1, 1916, pp. 749-781. [Gives a technical sketch of the military operations from information obtained from the French General Staff. It has been abstracted in the *International Military Digest* (New York), Vol. 3, 1917, No. 4, pp. 193.195.]

Times History and Encyclopædia of the War, London: Part 99, The Campaigns in Togoland and Cameroons, 1916; Part 121, The Campaign in German East Africa, Pt. I (Operations up to March, 1916); Part 146, The Campaign in German East Africa, Pt. II (Operations, March-October, 1916).

The campaigns in German Southwest and East Africa have been described in several personal narratives. The three given below, of special geographic interest, are reviewed in this number of the *Review* under "Geographical Publications."

H. F. B. Walker: A Doctor's Diary in Damaraland, Arnold, London, 1917.

W. Whittall: With Botha and Smuts in Africa, Cassell and Co., London, 1917.

F. Brett Young: Marching on Tanga, Collins, London, 1917.

Murray (London) announces the proximate publication of "General Smuts' Campaign in East Africa" by Brigadier-General J. H. V. Crowe, with an introduction by General Smuts.

Recent Geographical Material

Of the geography of the regions of the campaigns much has been written in German, but there is little recent literature in English. The best and most complete study is

Hans Meyer (edit.): Das Deutsche Kolonialreich: Eine Länderkunde der deutschen Schutzgebiete, Bibliographisches Institut, Leipzig, 1909-10. Vol. 1: Ostafrika, by Hans Meyer; Kamerun, by Siegfried Passarge. Vol. 2: Togo, by Siegfried Passarge; Südwestafrika, by Leonhard Schultze; Schutzgebiete in der Südsee, by Wilhelm Sievers; Kiautschougebiet, by Georg Wegener.

The rainfall and vegetation maps are particularly useful in a study of the military geography. Extensive bibliographies are furnished.

Short accounts appear in the series "Sammlung Göschen":

K. Dove: Togo und Kamerun (Die Deutschen Kolonien, I), Göschen, Leipzig, 1909.

K. Dove: Ostafrika (Die Deutschen Kolonien, III), Göschen, Leipzig, 1912.

K. Dove: Südwestafrika (Die Deutschen Kolonien, IV), Göschen, Leipzig, 1913.

Other general works are:

Alexander Knox: The Climate of the Continent of Africa, University Press, Cambridge, 1911. [Incorporates a vast amount of source material and is the most convenient reference work for a study of climatic conditions. Reviewed in *Bull. Amer. Geogr. Soc.*, Vol. 44, 1912, pp. 300-301.]

The Economic Resources of the German Colonies: I, German East Africa; II, German South-West Africa; III, West African Colonies, *Bull. Imperial Inst.*, Vol. 12, 1914, pp. 580-599; Vol. 13, 1915, pp. 110-134; 233-260; 392-422.

A. F. Calvert: The German African Empire, Laurie, London, 1916. [The same author has written a series of books on the individual colonies: South-West Africa during the German Occupation, 1884-1914, *ibid.*, 1915; Togoland, *ibid.*, 1916 (?); German East Africa, *ibid.*, 1917; The Cameroons, *ibid.*, 1917.]

Evans Lewin: The Germans and Africa, New York, 1915. [Treats of the origin and development of the colonies. Reviewed in *Geogr. Rev.*, Vol. 1, 1916, pp. 159-160.]

Individual Colonies

For the Cameroons consult:

Camille Martin: Togo et Cameroun: Formation et composition territoriales, *Renseign. Colon. (Suppl. à l'Afrique Française)*, Oct.-Dec., 1915, pp. 177-202.

W. V. Nugent: Geographical Results of the Nigeria-Kamerun Boundary Commission of 1912-13, *Geogr. Journ.*, Vol. 43, 1914, pp. 630-651.

Notes on the Cameroons by a Member of the West African Expeditionary Force, *Geogr. Journ.*, Vol. 48, 1916, pp. 403-406. [This number also contains a note and maps showing the provisional administrative divisions in Togoland and the Cameroons.]

Adolf Friedrich, Duke of Mecklenburg: From the Congo to the Niger and the Nile: An Account of the German Central African Expedition of 1910-1911, Philadelphia, 1914. [Reviewed in *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, p. 704.]

For German Southwest Africa ——

William Eveleigh: South-West Africa, London, 1916.

T. Tönnesen: The South-west Africa Protectorate, *Geogr. Journ.*, Vol. 49, 1917, pp. 282-300. [Accompanied by a map showing rainfall distribution and mineral deposits.]

P. A. Wagner: The Geology and Mineral Industry of South-West Africa, *Geol. Survey of Union of South Africa, Memoir No. 7*, Pretoria, 1916. [The first chapter describes the physical features and supplies a basis for a division into natural regions. See abstract in *Geogr. Rev.*, Vol. 2, 1916, pp. 155-156.]

For German East Africa ——

Charles Alluaud: La frontière anglo-allemande dans l'Afrique Orientale, *Ann. de Géogr.* No. 135, 1916, pp. 206-217.

E. W. Bovill: Notes from East Africa: The Uluguru Mountains and the Rufiji Plain, *Geogr. Journ.*, Vol. 50, 1917, pp. 277-283.

F. R. Cana: Frontiers of German East Africa, *Geogr. Journ.*, Vol. 47, 1916, pp. 297-303.

Sir Alfred Sharpe: The Kivu Country, *Geogr. Journ.*, Vol. 47, 1916, pp. 21-34.

E. M. Jack: On the Congo Frontier: Exploration and Sport, Unwin, London, 1914. [The author's article "The Mufumbiro Mountains" in the *Geogr. Journ.*, Vol. 41, 1913, pp. 532-550, is accompanied by a topographic map giving an excellent picture of the difficulties to travel in the region northeast of Lake Kivu.]

CORVO, OUR NEAREST EUROPEAN NEIGHBOR

By W. H. BABCOCK

Far at sea from Portugal, straggling in a long northwestward line toward America, lies the archipelago sometimes called the Islands of the Sun or the Western Islands but now generally known as the Azores. That line breaks into three divisions separated by wide gaps of sea: the most easterly pair, St. Michael and St. Mary; the main cluster of five islands, Pico being the loftiest and Terceira the most important; and the northwesterly pair, Flores and Corvo. These last make a little far-severed world of their own, sharing in none of the tremors and upheavals which from time to time more or less transform parts of the other two divisions. The remote origin of the pair was volcanic, and Corvo is little more now than an old crater lifted about 300 feet above the surface; but the fires have long been dead, and in historic times the lower strata have never shifted suddenly to produce any great earthquake. There have been changes, but they must be attributed for the most part to gradual subsidence.

These two islands, though almost as near to Newfoundland as to any point in Portugal, cannot be classed as American; yet Corvo in particular seems to have impressed the imagination of ancient and medieval explorers with a sense of some special relation to regions beyond, though possibly only to the entangling Sargasso Sea of weeds, which would lie next in order southwestward, and the menacing mysteries of the remoter wastes of the Atlantic. It may have been felt as the last stepping stone for the leap into the great unknown.

Origin of the Name

Flores, the island of flowers, thus prettily renamed by the Portuguese, is referred to as the rabbit island, Li Conigi, in the fourteenth-century maps and records; but Corvo has always borne, in substance, the same name, one of the oldest on the Atlantic. Probably the very first instance of its use is in the Book of the Spanish Friar,[1] written about 1350 (the author says he was born in 1305), rather recently published in Spanish and since translated for the Hakluyt Society publications by Sir Clements Markham. After relating alleged visits to more accessible islands of the eastern Atlantic archipelagoes, from Lanzarote and Tenerife of the Canaries to São Jorge (St. George) of the Azores, he continues "another, Conejos [doubtless Li Conigi], another, Cuervo Marines [Corvo—the sea crow island], so that altogether there are 25 islands."

[1] Book of the Knowledge of All the Kingdoms, Lands, and Lordships That Are in the World, and the Arms and Devices of Each Land and Lordship, or of the Kings and Lords who Possess Them. Written by a Spanish Franciscan in the middle of the 14th century. Published for the first time with notes by Marcos Jiménez de la Espada in 1877. Translated and edited by Sir Clements Markham. *Hakluyt Soc. Publs.*, 2nd Ser., Vol. 29, London, 1912. Reference on p. 29.

This account may not actually be later than the Atlante Mediceo map,[2] attributed to 1351—may even have been suggested by it, as some things seem to indicate. The Friar's voyages are perhaps merely imaginary, their variety and total extent being hardly believable. This very important map has been best reproduced in the collection by Theobald Fischer; on it the same name (Corvi Marinis) seems to be applied to both islands collectively, the plural form "insule" being used to introduce it. Both names are plain on the Catalan map of 1375.[3] It is more than probable that they date at least from the earlier half of the fourteenth century.

Possibly the name Corvo had been carried over by a somewhat free translation from the older Moorish seamen and cartographers, who dominated this part of the outer ocean from the eighth century to the twelfth. Edrisi,[4] greatest of Arab geographers, writing for King Roger of Sicily about the middle of the twelfth century, tells us, among other items, of the eastern Atlantic:

> Near this isle is that of Râca, which is "the isle of the birds" (Djazîrato 't-Toyour). It is reported that a species of birds resembling eagles is found there, red and armed with fangs; they hunt marine animals upon which they feed and never leave these parts.

This statement recalls the cormorants, which are supposed to be meant by the sea crows, "corvi marinis" of the later maps. They would naturally flock about the submerged ledges and the wild shore of Corvo and may be held to suggest either the crow or the eagle, though not closely resembling either. Everywhere they are the scavengers of the deep seas. Edrisi mentions a legendary expedition sent by the "King of France" after these birds. It ended in disaster. There is on the Pizigano map[5] of 1367 a pictorial record of Breton ships in great trouble with a dragon of the air and a kraken, or decapod, on the extreme western border of navigation, which may conceivably refer to this experience.

Ancient Memorials

But Corvo has even more ancient traditions and associations. Diodorus Siculus,[6] in the first century before the Christian era, wrote of a great

[2] Theobald Fischer: Sammlung mittelalterlicher Welt- und Seekarten italienischen Ursprungs, 1 vol. of text and 17 portfolios containing photographs of maps, Venice, 1877-86; reference in Portfolio V (Facsimile del Portolano Laurenziano-Gaddiano dell' anno 1351), Pl. 4.

[3] A. E. Nordenskiöld: Periplus: An Essay on the Early History of Charts and Sailing Directions, Stockholm, 1897, Pls. 11-14.

[4] Edrisi's "Geography," in two versions, the first based on two, the second on four manuscripts, viz.: (1) P. A. Jaubert (translator): Géographie d'Édrisi, traduite de l'Arabe en Français, 2 vols. (*Recueil de Voyages et de Mémoires publié par la Société de Géographie*, Vols. 5 and 6), Paris, 1836 and 1840; reference in Vol. 1, p. 201; (2) R. Dozy et M. J. De Goeje (translators): Description de l'Afrique et de l'Espagne par Edrisi: Texte arabe publié pour la première fois d'après les man. de Paris et d'Oxford, Leiden, 1866, pp. 63-64.

[5] [E. F.] Jomard: Les monuments de la géographie, ou recueil d'anciennes cartes européennes et orientales . . . . , Paris, [1842-62]; Pl. X, 1. Also W. H. Babcock: Early Norse Visits to North America, *Smithsonian Misc. Colls.*, Vol. 59, No. 19, Washington, D. C., 1913, Pls. 1 and 2.

[6] The Historical Library of Diodorus the Sicilian, in 15 Books. To which are added the fragments of Diodorus, and those published by H. Valesius, J. Rhodomannus, and F. Ursinus. Translated by G. Booth, Esq., in two vols., London, 1814. Reference in Vol. 1, Bk. 5, Ch. 2, pp. 308-309.

Atlantic island, probably Madeira, which the Etrurians coveted during their period of sea power; but the Carthaginians, its first discoverers, prohibited them, wishing to keep it for their own uses. If the Etrurians were thus well informed concerning one island of these eastern Atlantic archipelagoes, it is a fair conjecture that they had visited the others.

However this may be, it seems that the Carthaginians left memorials on Corvo. At least this is the most reasonable explanation of the extraordinary story repeated by Humboldt[7] in the "Examen Critique," apparently with full faith in its main feature at least, notwithstanding the fascinating atmosphere of romance and wonder which hangs about the details. In the month of November, 1749, it appears, a violent storm shattered an edifice (presumably submerged) off the coast of Corvo, and the surf washed out of a vault pertaining to the building a broken vase still containing golden and copper coins. These were taken to a convent or monastery (probably on some neighboring island). Some of them were given away as curiosities, but nine were preserved and sent to a Father Flores at Madrid, who gave them to M. Podolyn. Some of them bore for design the full figure of a horse; others bore horses' heads. Reproductions of the designs were published in the *Mémoires de la Société de Gothenbourg*[8] and compared with those on coins in the collection of the Prince Royal of Denmark. It seems to be agreed that they were certainly Phenician coins of North Africa, partly Carthaginian, partly Cyrenaican.

It has been suggested[9] that they may have been left by Norman or Arab seafarers, who certainly journeyed among the Azores in the Middle Ages. But, as Humboldt points out, that these should have left a hoard of exclusively Phenician coins, so much more ancient than their own, without even a single specimen of any other mintage, appears very unlikely. On the other hand it is true that Phenician vessels sailing northward in the tin or amber traffic would hardly be likely to be storm-driven so far northwestward as Corvo; St. Michael would have been a more natural involuntary landfall. This objection does not apply, however, if we suppose the deposit to be the work not of accident, but of full intention and deliberation, as the alleged edifice and vault would certainly tend to show. If these coins were deposited by Phenicians who erected permanent buildings, the remoteness of the island would be only an added reason for commemoration. The coins might have been immured in the vault for safe keeping or might have been enclosed in the corner stone, in accordance with the general custom of placing coins and records in the corner stones of notable structures.

Of course these details cannot be confidently accepted. As Humboldt suggests, it is to be regretted that we are without information as to the

[7] A. von Humboldt: Examen critique de l'histoire de la géographie du Nouveau Continent, 5 vols., Paris, 1836-37; reference in Vol. 2, pp. 237-240.

[8] In Vol. 1. See also Moedas phinicias e cyrenaicas encontradas em 1749 na ilha do Corvo, *Archivo dos Açores*, Vol. 3, pp. 11-113, for some account of Podolyn's discovery.

[9] Conrad Malte-Brun: Précis de géographie universelle, 8 vols., Paris, 1810-29; reference in Vol. 1 of that edition, constituting "L'Histoire de la Géographie," 1810, p. 596.

period or character of the edifice in question. But at least it seems most probable that Phenicians occupied or at any rate visited this island and deposited coins of Carthage and Cyrenaica.

Equestrian Statues

Furthermore, Corvo is one of several Atlantic islands reputed to have been marked by monuments generally of one type. Edrisi[10] knows of them in Al-Khalidat, the Fortunate Isles—bronze westward-facing statues on tall columnar pedestals. There are said to have been six such in all, the nearest being at Cadiz. Tradition places an equestrian statue also on the island of Terceira, as repeated in a much more modern work.[11] The Pizigano map of 1367, already mentioned, shows near where Corvo should be the colossal figure of a saint warning mariners backward, with a confused inscription declaring westward navigation impracticable beyond this point by reason of obstructions and announcing that the statue is erected on the shore of Atilie. But perhaps the best and most apposite account is that of Manuel de Faria y Sousa in the "Historia del Reyno de Portugal":[12]

> In the Azores, on the summit of a mountain which is called the mountain of the Crow, they found the statue of a man mounted on a horse without saddle, his head uncovered, the left hand resting on the horse, the right extended toward the west. The whole was mounted on a pedestal which was of the same kind of stone as the statue. Underneath some unknown characters were carved in the rock.

Apparently the reference is to the first ascent of Corvo after its rediscovery between 1449 and 1460. The mention of "characters" recalls those found in a cave of St. Michael, also by rediscoverers during the same period, as related by Thevet long afterward, most likely from tradition. A man of Moorish-Jewish descent, who was one of the party, thought he recognized the inscription as Hebrew, but could not or did not read it. Some have supposed the characters to be Phenician. There is naturally much uncertainty about these stories of very early observations by untrained men, recorded at last, as the result of a long chain of transmissions: but they tend more or less to corroborate the other evidences of Phenician presence.

It may be possible that the persistent and widely distributed story of westward-pointing equestrian statues marking important islands may have grown out of the ancient mention of the pillars of Saturn, afterward Hercules, and Strabo's discussion as to whether they were natural or artificial in origin; but this puts a severe strain on fancy. We know that the Carthaginians did set up commemorative columns; and that the horse figured conspicuously in their coinage. Nothing in the enterprising character of the Phenician people is opposed to the idea of incitement to exploration westward. It seems easier to believe that they set up these statuary monuments on one island after another than that the whole tradition has grown

[10] Edrisi, *op. cit.* (Dozy and De Goeje), p. 1.

[11] S. Morewood: Philosophic and Statistical History of Inventions and Customs, ... Inebriating Liquors, Dublin, 1838, p. 322.

[12] A. von Humboldt, *op. cit.*, Vol. 2, pp. 226-227.

out of a misunderstanding. Such statues might well vanish subsequently as completely as the great silver "tabula" map of Edrisi and many other valuable things of olden time.

Corvo has no statue now; but it is reputed to hold a statue's representative. Captain Boid (1834)[13] relates:

> Corvo is the smallest, and most northerly of the Azores, being only six miles in length, and three in breadth, with a population of nine hundred souls. It is rocky and mountainous; and on being first descried, exhibits a sombre dark-blue appearance, which circumstance gave rise to its present name, whereby it was distinguished by the early Portuguese navigators. . . . . It is not known at what period this island was first visited, though from a combination of circumstances, it is supposed, about the year 1460. The inhabitants are ignorant, superstitious, and bigoted, in the highest degree, and relate innumerable ridiculous traditions respecting their country. Amongst other absurdities they state, with the utmost gravity, that to Corvo is owed the discovery of the western world—which, they say, originated through the circumstance of a large projecting promontory on the N. W. side of the island, possessing somewhat of the form of a human being, with an outstretched arm toward the west; and this, they have been led to believe, was intended by Providence, to intimate the existence of the new world. Columbus, they say, first interpreted it thus; and was here inspired with the desire to commence his great researches.

Mr. Boid is wrong in his derivation of the name Corvo, as we have seen; wrong also, another way, in despising the "superstitions" as "absurd" and refusing them record, for they might embody some valuable suggestion. Humboldt thought, however, that the story of the pointing horseman might have grown out of this natural rock formed in human semblance. No doubt this is possible; but it would not account for like stories of the other islands nor the general similitude of their figures. Perhaps an equally valid explanation might be found in the former presence of such artificial figures, leaving a certain repute behind them and causing popular fancy to point out resemblances which would not have been noticed otherwise.

A more recent mention of this pointing rock occurs in "A Trip to the Azores" by Borges de F. Henriques,[14] a native of Flores. He says:

> Another natural curiosity which has been defaced by the weather and the bad taste of visitors is a rock resembling a horseman with the right arm extended to the westward as if pointing the way to the new world. Some insular writers deny the existence of this rock.

Need of Exploration

There seems still a good deal of vagueness about the matter, and Corvo might well be given a thorough overhauling for vestiges of ancient times. This naturally would be extended to the submerged area close to the shore, for the outlying reefs and ridges may mark the site of lower lands where human work once went on and where its traces and relics may remain. In expanse the island probably was not always what we find it now, six miles in length by at most three in breadth (seven square miles in all, as most accounts compute it) with fringes of rock running off from the shore

[13] Captain Boid: A Description of the Azores, or Western Islands, London, 1834, pp. 316-317.

[14] Borges de Figueiredo Henriques: A Trip to the Azores or Western Islands, Boston, 1867, pp. 35-36.

"lifting themselves high above the water in one place, blackening the surface in another, and again sinking to such a depth that the waves only eddy and bubble over them." Mr. Henriques says elsewhere "In many of the islands, but especially in Flores, there are vestiges clearly indicating that formerly as well as lately parts of the island have sunk or rather disappeared

FIG. 1—Representation of Corvo on fourteenth- and fifteenth-century maps as compared with its present outline.

The sources are as follows: (1) Theobald Fischer, work cited in footnote 2 of the text, Portfolio V, Pl. 4; (2) *ibid.*, Portfolio VII, Pl. 4; (3) A. E. Nordenskiöld: Periplus, Pl. 11; (4) Fischer, *op. cit.*, Portfolio XIII, Pl. 5; (5) Gustavo Uzielli, work cited in footnote 16, Pl. 8; (6) K. Kretschmer, work cited in footnote 17, Pl. 4; (7) Encyclopaedia Britannica, 11th edit., Vol. 3, p. 83.

in the sea." He cites for instance a notable loss of land in the summer of 1847.

There is reason to believe that Corvo has dwindled in this way much more, proportionately, than Flores. One striking indication is found in the comparison of the present map with those of the fourteenth and fifteenth centuries. For convenience sketches of these are appended. The relative position of the islands is about the same in all. The form of Corvo varies from the pear shape of the Laurenziano map (1351), and another shape not much later slightly resembling an indented segment of a circle, to the three-lobed or clover-leaf form which was accepted as the final convention or standard and first clearly appears in the great Catalan atlas[15] of 1375, repeated by Beccario 1435,[16] Benincasa 1482,[17] and others; but all agree in

[15] A. E. Nordenskiöld, *op. cit.*, Pl. 11.

[16] Gustavo Uzielli: Mappamondi, carte nautiche e portolani del medioevo e dei secoli delle grandi scoperte marittime construiti da italiani o trovati nelle biblioteche d'Italia, Part II (pp. 280-390) of "Studi Bibliografici e Biografici sulla Storia della Geografia in Italia," published on the occasion of the Second International Geographical Congress, Paris, 1875, by the Società Geografica Italiana, Rome, 1875; reference on Pl. 8 (the second edition, Rome, 1882, does not contain the plates). Also W. H. Babcock, *op. cit.*, Pl. 4.

[17] K. Kretschmer: Die Entdeckung Amerikas in ihrer Bedeutung für die Geschichte des Weltbildes. 2 vols. (text and atlas), Berlin, 1892; reference in atlas, Pl. 4.

making Corvo the main island and Li Conigi (Flores) a minor pendant. Corvo seems in every way to have commanded chief attention, and in size the difference was conspicuous and decisive. The difference certainly is great enough now, but conditions and proportions are reversed. Corvo has but one-eighth the area of Flores and less than one-tenth the population. In all ways it lacks advantages and conveniences, taking rather the place of a poor dependent.

There is no good reason for discrediting so many of the old maps. Their makers sometimes went wrong; but they tried to be accurate and would hardly, through a century or two, persist in making the northern island the greater one unless it was at first really so. Of course the most natural solution of the difficulty is that Corvo's border has sunk or the sea has risen over it, completely drowning the territory which made the lobes or curved outline of the island form in the medieval maps and leaving only above water its rocky backbone, with the crater for a nucleus. Apparently those lobes and their contents are just what might be most profitably dredged for and dived after.

Perhaps the island has not greatly changed since Mr. Henriques wrote his little sketch[18] of it in the sixth decade of the last century:

> The first part of the ride to it [the crater] is through steep and narrow lanes walled in with stones. Over those walls you can sometimes see the country right and left, which is divided into small and well-cultivated compartments by low stone walls. These small fields form narrow terraces, one above another, looking from the sea like steps in the hills. An hour's ride brings you to an open mountain covered with heath where browse flocks of sheep and hogs, and about an hour and a half more to the crater on the summit, now a quiet green valley, with a dark, still pond in the center. . . . . .
>
> The Corvoites, particularly the women, are a happy and industrious people and have strong and healthy constitutions. The men in trade evince a remarkable shrewdness, proverbial among the other Azorians, but in private life their manners are simple and unassuming. . . . . They are like a large family of little less than a thousand members, all living in the only village on the island.

[18] Borges de F. Henriques, *op. cit.*, pp. 35-36.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Monthly Meeting of December. A regular monthly meeting of the American Geographical Society was held on Tuesday evening, December 18, at the Engineering Societies' Building, 29 West Thirty-ninth Street. President Greenough presided. He submitted for confirmation the names of 22 candidates for Fellowship, each of whom had been approved by the Council, and they were confirmed as Fellows of the Society. Thereupon Mr. Theodoor de Booy of the Museum of the American Indian, Heye Foundation, New York, addressed the Society on "Unknown Parts of the West Indies." Mr. de Booy, whose article on the Virgin Islands of the United States in the November, 1917, number of the *Review* will be recalled, has spent the last eight years conducting archeological investigations in the West Indies. During this time he explored unknown areas in the larger islands and visited many of the smaller islands off the tourists' track. The regions described, and illustrated with colored lantern slides, included the Bahamas, the Cape Maysi district at the eastern extremity of Cuba, the west-central part of Jamaica, the interior of Hayti along the boundary between the two republics composing the island, the Virgin Islands, and Martinique.

NORTH AMERICA

War Activities of the U. S. Geological Survey. The activities of the U. S. Geological Survey during the fiscal year 1916-17 have been concentrated on investigations connected with military and industrial preparedness, as shown by the *Thirty-eighth Annual Report* of the Survey, just made public. These activities have included the preparation of special reports for the War and Navy Departments and the Council of National Defense, the making of military surveys, the printing of military maps and hydrographic charts, and the contribution of engineer officers to the Reserve Corps.

The Survey's investigations of minerals that have assumed special interest because of the war have been both expanded and made more intensive. Special reports giving results already at hand, the product of years of field and office investigation, have been published for the information of the general public or prepared for the immediate use of some official commission, committee, or bureau. Geologic field work has been concentrated on deposits of minerals that are essential to the successful prosecution of the war, especially those of which the domestic supply falls short of present demands. Every available oil geologist is at work in petroleum regions where geologic exploration may lead to increased production. Other geologists are engaged in a search for commercial deposits of the "war minerals"—manganese, pyrite, platinum, chromite, tungsten, antimony, potash, and nitrate.

The war not only diverted practically all the activities of the topographic branch of the Survey to work designed to meet the urgent needs of the War Department for military surveys, but led to the commissioning of the majority of the topographers as reserve officers in the Corps of Engineers, United States Army.

A large contribution to the military service is made by the map-printing establishment of the Survey. This plant has been available for both confidential and urgent work, and during the year has printed 96 editions of maps for the War Department and 906 editions of charts for the Navy Department. Other lithographic work, some of it very complicated, was in progress at the end of the year (*U. S. Geol. Survey Press Bull. No. 547*, December, 1917).

Forest Growth on Abandoned Farms. A hopeful outlook for New England is presented in a recent article by P. L. Buttrick (Forest Growth on Abandoned Agricultural Land, *Scientific Monthly*, July, 1917, No. 1, pp. 80-91). The abandoned farm is "coming back." Deserted because of its unfitness for agriculture, it is, by the natural process of "afforestation," becoming of value for its tree growth. Our Christmas trees come largely from the old-field spruces. The farms abandoned fifty years ago now furnish pulp-wood in considerable quantities. From the young white pines of Massachusetts box-boards are made. The loblolly pines of Maryland and farther south, growing on land where cotton was raised before the Civil War, now yield a large number of trees ten inches in diameter and sixty feet high. They are already a valuable commercial product. The tulip tree, known to lumber men as yellow poplar, grows rapidly on the abandoned

fields of the Southern Appalachians and is a very valuable and a rather scarce wood. Even the stunted scrub oaks, the red cedar and the gray birch, if carefully handled by foresters, can be made productive of lumber. Moreover most of these old-field growths are gradually reverting to the original forest type.

Evaporation from Snow Surfaces in Irrigated Regions. The amount of water evaporated from snow is an important element in any region where irrigation is necessary, and is dependent, wholly or largely, upon the water derived from melting snow. Some field experiments along this line have been made by F. S. Baker, of the Utah Experiment Station (*Monthly Weather Rev.*, Vol. 45, 1917, pp. 363-366). The result of this investigation is that an evaporation of 3 inches is a fair figure for the winter of 1915-16. The winter equivalent of snowfall in the same locality was 21.91 inches. Hence about 14 per cent of the total snowfall was evaporated. The possible effect of forests is briefly considered. It is believed that the shade and the diminished wind velocity due to forests decrease evaporation, but that this effect may be counteracted, at least in part, by the greater area exposed to evaporation by the snow on the branches of the trees. This would be especially true of conifers. R. DEC. WARD.

Influence of the War on the Population Growth of Salvador. In common with its neighbors, San Salvador, distinguished as the smallest and most densely populated of Central American republics, owes its growth of population almost entirely to natural increase. Prior to 1914 the average birth rate was 41.7 per thousand, the death rate 21. In 1915 the difference was far less favorable, and in 1916 the birth rate had dropped to 36.9 while the death rate had risen to 33, leaving a total increase of 4,818 only, the lowest on the demographic register. The high number of deaths is attributed to the abnormal increase of malaria and this in turn is explained by the high price of quinine and other drugs. Thus, as the Director General of Statistics remarks (*Anuario Estadístico de 1916*, Direcc. Gen. de Estadística, San Salvador, 1917), do even the populations remote from the European War feel the retrogressive action of the great conflict.

EUROPE

The Situation of the Steel Industry in Great Britain. The industrial development of Britain commenced under favorable geographic conditions. The Coal Measures supplied not only fuel but also ore for the manufacture of wrought iron. With the coming of the steel age in the second half of the nineteenth century the situation became somewhat less favorable; costly processes of refinement demanded another form of ore, the Bessemer "acid" process of steel making being dependent on the use of a pure hematite. The distribution of ore of this grade is restricted in Britain. The Cumberland mines yield a hematite amongst the richest and purest in the world, and, as regards money value, the production of these mines stands first in the domestic supply, but it is not unlimited and the working is expensive. The British lead in steel production was maintained through importation of the raw material, a method that could be profitably followed by reason of the accessibility and productivity of the coalfields and the high organization of the merchant marine. In particular Bilbao, with quarries near the sea, became the leading source of imported ore. At present, though the Bilbao mines are nearing exhaustion and recourse must be had to less accessible deposits, Spain still contributes a major share, in 1913 not less than 60 per cent of the British import.

The eighties of the last century saw the beginning of the great steel industry of the Rhineland. Germany's coalfields, however, do not occupy so favorable a location as those of Britain, nor could Germany enjoy the same command of foreign markets for hematite. On the other hand, within easy reach were the vast iron deposits of Lorraine, estimated to hold 5,000,000,000 tons of ore. From the southern tip of Belgium to the south of Metz and Nancy the Jurassic ironstone formation runs along the political frontier. Before the war over three-quarters of the German iron-ore output and nearly nine-tenths of the French production came from within ten miles of the boundary. On the German side the Saarbrücken coalfield lies in close proximity. The ore, however, is phosphoric and unfit for steel making by the Bessemer process. Germany turned towards the "basic" process, whereby is obtained a grade of steel inferior but yet satisfactory for most constructional purposes and cheaper. Thus Germany, whose steel output at the beginning of the century was hardly equal to that of Britain, is now producing more than all the Allies put together except America. Britain has kept her place in the world's supply only in respect of high-grade tools and special steel alloys. In America the same tendency appears. Though great reserves of hematite are untouched, it is found more profitable to work the low-grade phosphoric ores near the developed lines of transportation, and the production of basic steel is assuming more and more importance.

In the manufacture of acid steel Britain is therefore unique. That she has so far been able to maintain it is due in large part to the geographical circumstances suggested above, marine supremacy, character and location of the coalfields. Already more than half the raw material of the industry comes from abroad. As the readily accessible deposits of hematite become exhausted this dependence may not be profitably sustained. But there is an alternative to costly importation in utilization of the home supply by the basic process. The Jurassic rocks of Britain, like those of Lorraine, are rich in phosphoric ore. In Cleveland (the northern end of the Jurassic escarpment) such ores have been worked for many years; indeed the basic process subsequently developed by Germany originated here. Besides the Cleveland deposits there are others favorably situated in regard to the eastern coalfields which are also well placed for importation of the foreign low-grade ores of northern France or Scandinavia. Thus might arise a locational differentiation of the steel industry; the west maintaining the output of high-grade material, while the east developed the cheaper basic product (W. G. Fearnsides: The Shortage of the Supply of Non-phosphoric Iron Ore, *Journ. Roy. Soc. of Arts*, Sept. 28, Oct. 5, and Oct. 12, 1917; abstracted in *Nature*, Nov. 22, 1917).

The Population of Spain. According to estimates made by the Instituto Geográfico y Estadístico of Madrid the population of Spain on December 31, 1916, was 20,747,893 (*Rev. de Geogr. Colon. y Mercantil*, Vol. 14, 1917, No. 5-6, pp. 174-175, Real Soc. Geogr., Madrid). This is a gain of 116,983 since December of the preceding year. One notable feature of the estimate is that in eleven of the forty-nine provinces there has been a decrease since 1915. Of these eleven, six provinces show a loss from the estimated population in 1914, and three have fewer inhabitants than in 1910. A comparison of recent statistics as given in the last issues of the "Statesman's Year Book" shows that this condition is not due to emigration, for in 1914 and 1915 less than half as many people emigrated from Spain as in the two preceding years. Economic conditions in Latin America discouraged Spanish immigration into the New World. The explanation of the loss in population in some of the Spanish provinces seems rather to be found in the decided gain made by other sections of the country. Madrid, Valencia, Barcelona, and the Canary Islands show a rapid growth in the last few years. These places are centers of industry and commerce, while the regions where loss of population is recorded depend upon agriculture and viticulture. Except in a few favored districts such as the *vega* of Valencia and the valley of Seville, an unproductive soil coupled with primitive methods renders farming an unprofitable occupation. Large areas in northern Spain where grape growing was formerly the principal industry have suffered from the invasion of the American grape louse. These conditions are accelerating in Spain the movement of population toward industrial and commercial centers, creating a denser population in the regions already most thickly populated and drawing people away from regions where density is already least.

AFRICA

The Climate of German East Africa. A study of the climatology of German East Africa, by Major H. G. Lyons, F.R.S., appears in a recent number of the *Quarterly Journal of the Royal Meterological Society* (Vol. 43, 1917, pp. 175-195). The discussion is especially timely because of the interest in the region as one of the recent theaters of war and because so little accurate information is available in regard to that particular district. The climatic data for German East Africa have usually been published in the official publications dealing with the German colonies (*Mitteilungen aus den deutschen Schutzgebieten*, Berlin, 1888-1912), and there have also been published several summaries and discussions of these data by prominent meteorologists. The colony lies between Lakes Tanganyika and Nyasa on the west and the Indian Ocean on the east and extends from near the equator to about latitude 10° S. It has low coastal plains on the shore of the Indian Ocean, the hill regions of Usambara in the northeast, of Iringa in the southeast, and of Langenburg in the south. To the westward lies the great plateau of the interior. By reason of its position near the equator most of the colony receives heavy tropical rains in the wet season. When the drier northeasterly and southeasterly air currents sweep over it, dry seasons occur, which, in some parts, last several months and are of considerable aridity. In places there are two well-marked maxima of rainfall, with a minor dry season between them, as in Uganda. The coast, which has its winds directly from the Indian Ocean, naturally receives a heavier rainfall than many parts of the interior.

In the coastal belt the hot, damp days and nights, especially from December to February, are very trying to Europeans. For days at that season the temperature may never fall below 80° F. Rain falls in every month, the maximum coming in March-May. The amounts are large. Coconut palms, sugar cane, aloes, bananas, and mangoes flourish.

The Usambara hills, in the northeast, have the advantage of elevation. At the higher altitudes, above the forest, many European plants can be cultivated, and persons whose health has deteriorated on the hot, enervating coast may regain strength and vitality. Kilimanjaro shows a beautiful series of vertical climatic zones. Bananas are cultivated on the lower slopes, and lately coffee and maize are being raised. Above the forest zone are the grass slopes, where large herds of sheep and cattle can graze. At still higher levels the vegetation becomes sparser and assumes an alpine character. The inland plateau (4,000-5,000 feet) has a long, hot dry season from May to October. This gives the greater part of the interior its character of savana forest, often passing into thorn forest. The end of the dry season brings the highest temperatures, even reaching 100°, in spite of the altitude. The rainfall is generally very moderate in quantity (December-April). This plateau is mainly a pastoral region.

The lake district has a moister climate than the plateau. The wet season is primarily March, April, and May. A minor rainy season, in November and December, continues in some parts through January and February. As the result of the plentiful rainfall and of the hot, equable climate, luxuriant vegetation flourishes. R. DEC. WARD.

The Economic Future of French North Africa. In a recent paper (Problems of French North Africa, *Journ. Roy. Soc. of Arts*, June 8, 1917), Captain Philippe Millet, colonial editor of *Le Temps*, Paris, depicts the present situation in Algeria, Tunis, and Morocco and outlines the problems that confront France in its future dealings with these countries on the Mediterranean border of Africa.

Captain Millet spoke of these countries as really forming an island, being bounded on the east, north, and west by the sea, and on the south by the desert. We know that this conception of the isolation of these countries is as old as the early days of the Roman occupancy of North Africa. One day a Roman saw from a mountain top in Algeria an undulating surface, far away to the south, which he believed was the sea. It proved to be a sea of sand, isolating Roman Africa more effectively than did the waters on the other borders.

In the time of the Roman Empire, French North Africa was really a part of the European system. This tie was finally broken by Islam, but France has revived the old relation. The present connection between the northern and southern Mediterranean shores is becoming closer every day. The man who sails from Marseilles at dawn sees the next dawn at Algiers. These African lands, so near Europe, are in resources among the richest in the world. The continuous growth of harbors and cities, Algiers and Oran, for example, is evidence of great economic development. Though Morocco is only beginning to develop its resources, the total trade of French North Africa amounted, before the war, to a little over $360,000,000 a year, over half of which represented trade between North Africa and France, the mother country. Moreover, the present wealth of this African France is still small compared with what it will become. The area of its farm lands is equal to all the arable land of Italy and Spain together, and not over a fourth of it is yet under cultivation. The mineral wealth seems to be equally important, not only in Algeria, where the great iron deposits of the Uezzan region are still untouched, but probably in Morocco also. In a word, North Africa has unlimited possibilities such as give an old nation like France indefinite outlet for its economic energy.

The census of 1911 showed 800,000 Europeans in Algeria alone, of whom 500,000 were French citizens. There are 50,000 Frenchmen in Tunis and 40,000 in Morocco. Many of these people are French, not by birth but by naturalization. France is absorbing in North Africa new European blood, chiefly Spanish and Italian, exactly as the United States turns into American citizens thousands of immigrants from abroad. It is a significant fact that in 1912 the French elementary schools in Algeria contained, besides 75,000 French children, 44,000 children of foreign nationality. Nearly all the European children are educated in the French schools. In a generation or two they will be a part of the French nation.

It is a noteworthy fact, also, that the French birthrate in Algeria is very high, thus providing France with additional new blood which she does not find in the ranks of her home population.

The native element, being Mohammedan, has much in common with the Egyptians and does not easily understand French ways. It is doubtless fortunate that among the whole native element of Algeria, estimated at ten or eleven millions, about nine-tenths are pure Berbers. In other words, they are of ancient white stock and may be regarded as intermediary between the Arabs and the Europeans of Algeria. Thousands of the Berbers have been in the habit of going to France, where they work in factories and wear European clothing. Over 270,000 of these North Africans are now soldiers fighting in Europe under the French colors. Thus this African France, still in its infancy, is adding substantial strength to that of the old country. CYRUS C. ADAMS.

ASIA

Japan, the Commercial Focus of the Pacific. A list of the chief Pacific ports ranked according to their foreign trade in 1916 is given in *Commerce Reports* for October 31, 1917. Excluding Hongkong, of which complete official statistics are not kept, the ports with an annual trade exceeding a million dollars are: Yokohama, $353,000,000; Kobe, $352,000,000; Shanghai, $348,000,000; Singapore (1915), $273,000,000; Sydney (1915), $257,000,000; San Francisco customs district, $209,000,000; State of Washington customs district, $300,000,000. Most significant is the position of the Japanese ports. They exhibit the results of an enormous industrial and commercial progress during the war. Industrially Japan has profited both by the increased call for her old-time products, textiles for instance, and the new demand for war materials. Demands have grown in the old-established markets—imports from the United States have doubled; Chinese needs have created a boom trade in bar silver, and markets practically new have been opened up—exports to South Africa increased by 400 per cent between 1915 and 1916 (*Suppl. to Commerce Repts. No. 55a*, Aug. 28, 1917, and *Commerce Repts.*, Feb. 5, 1917; see also *ibid.* for March 31, 1917). Trade expansion has been fostered, indeed rendered possible, by the parallel progress in the establishment of a mercantile marine. In July, 1914, there were three great shipping nations in the Pacific: Britain, Japan, and the United States. Two years later Japan was entirely master of the situation. Britain was outmatched, while the tonnage (gross) carried under the United States flag was reduced from 80,000 to 5,000! Japanese tonnage had made a considerable absolute increase (Abraham Berglund: The War and Trans-Pacific Shipping, *Amer. Econ. Rev.*, Sept., 1917).

Of Japan's ports Kobe, outlet for the busy and productive region round the eastern end of the Inland Sea, has made the greatest advance. Figures for the first seven months of 1917 show Yokohama, heretofore the first port, completely outranked by Kobe. It is improbable that the trade of Hongkong approaches that of the Japanese port; so Kobe may justly claim to be the first port of the Pacific in foreign commerce.

AUSTRALASIA AND OCEANIA

The Settlement of Tropical Australia. Dr. Griffith Taylor, of the Commonwealth Bureau of Meteorology, has lately given considerable attention to the climatic controls of human settlement, with special reference to Australia (see the review on p. 86). In a recent discussion of the settlement of tropical Australia (reprint, *Melbourne Herald*, no date), Dr. Taylor deals with the season and "reliability" of the rainfall and with the wet-bulb temperatures as two critical factors in determining human settlement and human occupations. A chart is given showing that as regards the reliability of the rainfall over the eastern portion of the Barkly Tableland—a valuable grazing area in the Northern Territory—the average "deviation" (departure from the normal) is nearly 50 per cent. This condition, which implies that here the rainfall may be anywhere between 12 and 37 inches, is not, in the opinion of the author, suited to economic wheat-growing. Dr. Taylor adopts 70° wet-bulb temperature "as the limit of comfort for our race." This means that when the mean wet-bulb readings average 70° for a long time the climatic conditions are not suitable for close white settlement. On the other hand, open-air occupations, like stock raising, may be successfully followed. The duration of wet-bulb readings of 70° is shown for Australia by lines. These lines represent a duration of from twelve months at Thursday Island, in the extreme north, to two months at Brisbane, and no months over about half of southern Australia. The six-months duration of 70° wet-bulb readings is believed to be "a definite climatological boundary." Locally the unfavorable conditions are ameliorated by other factors, such, for example, as the southeast trades on the Queensland coast. Dr. Taylor's conclusion is that the empty northern lands of Australia are pastoral, not agricultural. They are not suitable for white labor *at present*, although a gradual acclimatization process may fit future generations of white men and women for residence there. R. DeC. Ward.

HUMAN GEOGRAPHY

The Desert Aridity of Heated Houses. The relative humidity of an ordinary heated house during the colder months approximates that of desert air. The indoor "climate" has become thoroughly artificial. We live, for most of our northern winters, in calm, "dead," desiccating air. This subject has been investigated by several writers, some of the early discussions being by R. DeC. Ward in the *Boston Medical and Surgical Journal*, March 1, 1900, and in the *Journal of Geography*, September, 1902, and by Mark

Jefferson in the latter journal, December, 1902. A further contribution to the matter has been made by S. D. Flora of the U. S. Weather Bureau at Topeka, Kan. (*Monthly Weather Rev.*, Vol. 45, 1917, pp. 231-233). The observations were made indoors and outdoors during November and December. The mean relative humidity indoors was 28.4 per cent, that outdoors, 77.6 per cent. The corresponding mean temperatures were 73.2° and 33.9°. The question of raising the humidity indoors is not as simple as it seems. The amount of water required for evaporation is large, and, if the air becomes too damp, moisture will condense on windows and on painted walls in cold weather. The rational solution of the problem is to keep rooms and houses from being excessively heated, for higher temperatures mean greater capacity for water vapor; to provide for a certain amount of evaporation; and to maintain good ventilation.

In connection with the physiological effects of dry indoor air some observations made by Professor E. L. Thorndike and P. J. Kruse of conditions in schools are noteworthy (*School and Society*, Vol. 5, 1917, pp. 657-660). Two divisions of a sixth grade of 43 pupils each, of equal initial ability, were treated alike in every respect except in regard to the dryness of the schoolroom. The "dry" group worked in a relative humidity averaging 28.7 per cent. The "moist" group were in a room whose humidity averaged 42.2 per cent. The temperature was alike for both groups, about 67.4° F. The two groups were carefully tested, with the result that there is "no demonstrable effect of relative humidity on the intellectual progress of schoolchildren. What slight difference there is favors the dry condition." The conclusion is that there is no likelihood that the humidification of schoolrooms during the winter will improve the mental work of the children.

Professor E. G. Dexter ("Weather Influences," 1904) some years ago found that schoolchildren showed an excess of demerits for low humidity as compared with those for moist air. The inference was that restlessness increased in drier air. The stimulating, nervous effects of dry air are well known, as are the quieting effects of damp air, especially when warm.

R. DEC. WARD.

GEOGRAPHICAL NEWS

Founding of the Cortes Society. Interest in Latin America has found new expression in the recent formation of "The Cortes Society" with offices in the Museum of the American Indian, Heye Foundation, Broadway at 155th Street, New York. The purpose of this new society is to publish documents and narratives dealing with the discovery and conquest of Latin America. Its aim will be to make available to the English reader unpublished manuscripts and accounts never before translated. In this it will do work similar to the Hakluyt Society, but in a special field. The undertaking should have a wide appeal, for some of the works of the early Spanish explorers, products of Spain's glorious literary past, dealing with a theme that was of all-absorbing interest at the time, make extremely entertaining reading today. As contributions to geography such volumes as those just published, the "Narrative of Some Things of New Spain and of the Great City of Temestitan, Mexico, written by the Anonymous Conqueror, a Companion of Hernan Cortes," translated by Marshall H. Saville, and "An Account of the Conquest of Peru, written by Pedro Sancho, Secretary to Pizarro and Scrivener to His Army," translated by Philip A. Means, are of great value, for both give descriptions of the land and people in regions that offer most striking examples of how physical environment has influenced the development of human culture. Works which will follow during the year 1918 will include the "Misfortunes of Alonzo Ramirez, by Siguenza y Gongora," translated by George Parker Winship, the "Itinerary of Grijalva," translated by Marshall H. Saville, the "Narrative of the Discovery and Conquest of the Kingdoms of Peru, by Pedro Pizarro," translated by Philip A. Means, and the "Account of the Conquest of Mexico, by Andres de Tapia," translated by Randolph M. Saville.

The Cortes Society has a membership of about eighty individuals, as well as societies and libraries, whose interest in Latin America is literary, scientific, and historical. There are no dues, a member's only obligation being to subscribe to the publications of the Society. The following are the officers: President, F. W. Hodge, Bureau of American Ethnology, Washington, D. C.; Vice-President, General Hugh L. Scott, War Department, Washington, D. C.; Secretary and Treasurer, Marshall H. Saville, Museum of the American Indian, Heye Foundation, New York; Council: the above officers and George Parker Winship, Harry Widener Memorial Library, Harvard University, Cambridge, Mass., and Philip A. Means, Harvard Club, Boston, Mass.

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

General

Indian population in the United States and Alaska, 1910. 285 pp.; maps, diagrs. Bur. of the Census, Dept. of Commerce, Washington, D. C., 1915.

This volume deserves more than passing notice, for it is the result of the first attempt to secure through the census special data concerning the Indians as a separate element of the population. While the Department of Indian Affairs has for many years kept a roll of all Indians under its charge, these data were never subjected to systematic treatment or even made readily available to the public. Frequently one meets with these legitimate inquiries: Is the Indian steadily dying out under the economic and physiological pressure of our own culture, or is he holding his own? To what extent is he being assimilated, and what are the observable effects of race mixture with whites? The volume before us may be said to be the first discussion of these problems from the standpoint of systematic data.

The census returns show a total of 265,683 Indians in the United States and 25,331 in Alaska. Every state in the Union returned some Indians, but their distribution varies: Oklahoma leads with something more than one-quarter of the whole, while Arizona, New Mexico, South Dakota, California, Washington, Montana, and Wisconsin together account for one-half. These and other facts of distribution are shown not only by convenient tables, but by sketch maps and diagrams. As compared with the enrollment of the Department of Indian Affairs, there has been an increase of 7 per cent since 1890 in the United States, but a decrease in Alaska of 23 per cent, though in this case the data are far less reliable. As noted in the text of the report (p. 10) some allowance must be made for mixed marriages, since all offspring of such unions are counted as Indians; but even so there is no reason for assuming that the Indians of the United States are dying out. Furthermore, the chapter on age distribution shows that one-eighth of the population exceeded fifty years—a fair longevity.

However, one of the chief features of the report is the status of the mixed-blood. Thus, in the United States these full-bloods, as enumerated, were 56.5 per cent of the total and the mixed-bloods 35.2 per cent. For 8.4 per cent of the returns no data as to blood were given. Of the mixtures, 88,030, or 33.1 per cent, were with whites, of which 27.7 per cent were the offspring of marriages between full-blood Indians and whites, while of the residue 49.9 per cent of the total were more than half white. Thus, it is clear that the tendency is for those of partial white descent to marry white instead of Indian. Unfortunately the reports do not give us the character of the white-Indian marriages, but it is generally assumed that few white women marry full-blood Indians, the rule being for the reverse, so that the true half-breeds are the offspring of white men and Indian women. Reverting to our main topic, it is clear that the Indian is in a fair way of being absorbed by the whites.

Naturally the respective tribal groups differ in the amount of race mixture. Thus the Hopi, Navajo, and Zuñi are practically free from all mixtures; while the St. Regis and Croatan are less than 10 per cent pure-blood; and even the well-known Cherokee are but 22 per cent pure. On the whole, the purest groups are found in New Mexico and Arizona, but outside these states there appears no variation concomitant with geographical position. On the other hand, there is a correlation between the amount of mixture and cultural condition, since those tribes that have resisted most successfully the modification of their old modes of life are precisely the ones that lead in purity of blood.

The classification of mixed and full-bloods by ages reveals an excess of young people among the former; but this cannot be interpreted as wholly due to differences in the death rate for each class, for the data upon fertility show that sterility decreases steadily with the amount of white blood in the parents. Thus, while among full-bloods 10.7 per cent of marriages were without issue, among "the marriages of full-bloods with mixed-bloods, where less than one-half of the blood was white, the percentage of sterility was 8.8; for the marriages of full-bloods with whites, where one-half of the blood was white, the proportion of sterility was 7.7 per cent.; for the marriages between mixed-bloods, where the proportion of white blood may have varied considerably but was probably

one-half or more, sterility was shown in 7 per cent of the cases; and finally, for marriages of mixed-bloods with whites, where more than one-half and often three-fourths or more of the blood was white, the percentage of sterility was only 5.8. Thus an inverse relation between the amount of white blood in the married couple and the proportion of childless unions seems to be established by" the percentages. Furthermore, when the number of children is considered the mixed-bloods lead, but the marriages in which negro blood is found lead those with white blood. In some respects this excess of mixed-blood children is the most important point in the whole report, especially since an analysis of the vital data for these children shows that those of mixed-blood have greater chances of life. Hence, "the results of studies on sterility, on fecundity, and on vitality all point toward one conclusion, and that is that the increase of the mixed-blood Indians is much greater than that of the full-blood Indians, and that unless the tendencies now at work undergo a decided change the full-bloods are destined to form a decreasing proportion of the total Indian population and ultimately to disappear altogether."

It is a matter of no small significance that more than 60 per cent of all male Indians over ten years of age were engaged in gainful occupations and of these about 80 per cent were farmers or stock raisers. But 45.3 per cent of Indians are illiterate and but 31.3 per cent of those over ten years of age were unable to speak English. About three-quarters of the Indians are tax payers. These and many other facts of interest are made plain by tables and diagrams, all of which show the rapid march of cultural and racial assimilation.

Yet the most distinctive feature of the book remains to be noted—its grouping of all Indians according to their tribal and linguistic classifications. One of the great triumphs of American anthropology is the perfecting of a complete list of Indian linguistic families and the identity and habitat of the tribal divisions under each. All the statistical tables in this report are so classified as to show the returns for each of these tribal divisions and their distributions by states and counties. The explanatory text gives in alphabetical order a brief statement of the linguistic and geographical position of each recognized tribe; and, as this is an up-to-date and accurate compilation, this part of the volume stands as the best reference handbook on the subject. Fifty-two linguistic families are represented, embracing in all about three hundred and fifty tribal divisions. The data are so tabulated as to show the full condition of each tribe and the places of residence for all its members. Finally, a revised edition of the Powell linguistic map of North America on the scale of 1:15,000,000, is appended. Many editions of this map have been issued by the Bureau of American Ethnology since its first appearance in 1891, and there are few prominent anthropologists in the United States who have not at one time or another had a hand in its revision. Hence, as it stands, this map is the latest and most authoritative presentation of the linguistic distribution of Indian tribes in the sixteenth century and is one of the most important ethno-geographical contributions of our time. Some differences of opinion will always exist as to the exact limits of many of the linguistic areas designated on this map, but in the main positions all students are now agreed. Since the Indian seldom recognized very exact boundaries to his hunting lands or fully respected the claims of his neighbors, the precise boundaries upon the map should be taken as approximate.

CLARK WISSLER.

UNITED STATES

North Atlantic States

—— **New England, A handbook of: An annual publication.** 843 pp.; maps, ills., index. (Sargent's Handbook Series.) Porter E. Sargent, Boston, 1916. $2.50. 7½ x 5.

This is a book for the automobile tourist, not to help him find his way, but to assist him in getting real pleasure and satisfaction from his visits to the towns and cities that are connected by the most frequented automobile routes. The volume includes twelve introductory chapters dealing with the general features of New England, fifty-seven route descriptions, and a series of directories of ferries, hotels and tea rooms, schools, camps, etc. The description of each town takes up in general its location, its sites of interest, and the historical and literary events associated with it. This portion of the volume has been done with great care. Only occasionally is an item included that good taste would have suggested should be omitted. Any visitor to New England will find these descriptions most helpful and satisfying. Indeed it would be a poor tourist who would not be led from his beaten path by the alluring descriptions of little-advertised places.

The general chapters deal with the surface, climate, flora, and aborigines; with the New Englander, his language, the New England village, roads and highways, New Eng-

land architecture, and the several states. These chapters are very unequal in character. The geological chapter is too technical for a layman, the chapter on New England climate is flippant and inadequate. The introductory chapter on "New England in the Large" and the chapters on the flora, on the language, and on the New England village are dignified and helpful, perhaps the best sections of this portion of the book. Taken as a whole the volume is worth while even to a New Englander, but every New Englander will regret the frequent sarcastic and would-be humorous interspersions that detract so much from the quality of a needed volume. The promised later edition should include more maps, especially local maps, and exclude many crudities hardly to be excused even in a first edition. R. E. DODGE.

GREGORY, H. E., AND A. J. ELLIS. **Ground water in the Hartford, Stamford, Salisbury, Willimantic, and Saybrook areas, Connecticut.** 150 pp.; maps, diagrs., ills., index. *U. S. Geol. Survey Water-Supply Paper 374.* Washington, D. C., 1916.

GROVER, N. C., C. C. COVERT, C. H. PIERCE, AND G. C. STEVENS. **Surface water supply of the United States, 1914. Part I: North Atlantic slope drainage basins.** 195 and xxxvii pp.; ills., indexes. *U. S. Geol. Survey Water-Supply Paper 381.* Washington, D. C., 1916.

HADIDA, M., edit. **Guia de New York para los touristas hispano-americanos.** 120 pp.; ills. Agencia de Touristas Latino-Americanos, New York, 1916. 25 cents. 7½ x 4½.

HARPER, R. M. **The natural vegetation of western Long Island south of the terminal moraine.** Reprinted from *Torreya*, Vol. 17, 1917, No. 1, pp. 1-13.

HARSHBERGER, J. W. **The New Jersey pine barrens.** Ills. *Amer. Museum Journ.*, Vol. 17, 1917, No. 4, pp. 245-252.

JOHNSON, CLIFTON. **New England: A human interest geographical reader.** xii and 371 pp.; map, ills., index. Macmillan Co., New York, 1917. $1.00. 7½ x 5.

North Central States

BLAIR, W. R. **Free-air data at Drexel Aerological Station: January, February, and March, 1916.** 59 pp.; diagrs. *Monthly Weather Rev. Suppl. No. 5.* U. S. Dept. of Agriculture, Washington, D. C., 1917.

The rapidly increasing importance of aviation, in war, and, after the war, in peace, puts more and more emphasis upon the need of securing reliable data from the free air. The Weather Bureau, at its aërological station at Drexel, Nebraska, is carrying on systematic work in the exploration of the air. The present publication, which bears the sub-title *Aerology No. 2*, gives the complete data for January, February, and March, 1916. There is a brief introductory statement, and six diagrams show the distribution of the free-air temperatures above Drexel during six different periods of observation. Later on, when air routes are regularly followed by a commercial airplane service, these data from Nebraska will prove their practical usefulness. R. DEC. WARD.

—— **Rosenwald Hall, Four addresses at the dedication of.** *Univ. of Chicago Mag.*, Vol. 7, 1915, No. 6, pp. 175-181. [Rosenwald Hall is the new home of the Departments of Geology and Geography of the University of Chicago. The four addresses are: "Some Matters of History" by R. D. Salisbury; "The Earth Sciences and Education" by Eliot Blackwelder; "The Earth Sciences and Government" by F. W. DeWolf; and "The Earth Sciences and Culture" by W. W. Atwood.]

EUROPE

THE LOW COUNTRIES, LUXEMBURG

BEEKMAN, A. A. **Nederland als polderland.** 2nd edit. xii and 475 pp.; maps, diagrs. W. J. Thieme & Cie, Zutphen, [1915?]. 9 x 6.

This work not only is one of the few works in existence that deal with the intricate system of the reclaimed lakes, riverbanks, and seashores of the Netherlands but can be said to cover the subject undertaken so thoroughly that later students and authors will constantly be forced to use it for reference. It would be hard to give a literal English translation of the title. *Polder* means a "drained marsh" and *polderland* should mean "land formed by the draining of marshes." Not all reclaimed land in the Netherlands, however, was formed from marshes and lakes; considerable areas were redeemed by the control of river courses and even by fighting the sea for supremacy.

As an officer of the Engineer Corps of the Dutch Army, Dr. Beekman not only had every opportunity of studying the reclaimed areas of the Netherlands but brought out,

thirty years ago, a first edition of the work under review. In the introduction of this second and greatly enlarged edition he deplores the ignorance of the Dutch themselves of the methods by which the more important part of the Netherlands has been formed and the means by which these same lands are protected from their ever-present enemy, water. With the small neutral country of the Netherlands in constant apprehension from a German invasion, it is interesting to be able to study, in Dr. Beekman's book, the means that could be employed to inundate certain parts of the country in order to form an aqueous border against an invading host.

The author has divided the entire Netherlands into districts according to their geological features and begins the description of each district with a thorough historical study showing the exact area before reclamation and the gradual victory of man. Not only are these data valuable to the expert in hydraulics, but the historical student finds here an explanation of the seemingly arbitrary boundaries of the Dutch provinces and exhaustive information regarding the obscure origin of many place-names, especially of those ending in *sluis, sloot,* and *dam,* these endings meaning "sluice, or lock," "ditch," and "dam."

After an historical dissertation on each district, the author describes at length the means that were employed in draining or reclaiming and gives statistical figures showing in each instance the exact area of land that was gained, its depth below sea level, its agricultural possibilities in relation to its geology, and the manner in which its waterways connect with the canal system of the surrounding country.

The earliest type of windmill as well as the latest type of centrifugal pump are described, with their application to the many problems of the Dutch drainage systems. This machinery is, of course, used only in the reclamation of lakes and marshes. But the means by which the Dutch curb their rivers and make them narrower by a system of dams, thereby gaining large areas of dry and extremely fertile land, are also described in detail: so also are the methods used, by the building of enormous dikes, not only to prevent encroachment of the sea, but to form new land by the very action of the sea itself.

The student of early man in Europe can gain much from a perusal of Dr. Beekman's book. Before Germany was settled, the Netherlands were inhabited by the Batavians and the Frisians. These rude, paleolithic tribes erected the various types of hummocks found throughout certain provinces of the Netherlands to serve as a protection against the rise of the surrounding waters, in very much the same manner as the Apalachees built their mounds in the Everglades of Florida. And even in historical times, Dr. Beekman tells the reader, a sudden rise in water level due to the breaking of a dike has sometimes forced the inhabitants to take up their abode on one of the so-called "shelter-hills" built during the Roman occupation.

Dr. Beekman's text alone would be a welcome addition to our scant knowledge of the subject with which he deals. But, in addition, he furnishes us with numerous valuable maps. A general map of the Netherlands, 1:600,000, shows the drainage basins (with profiles showing the gradients of the principal rivers). Two maps, 1:275,000, show the polder systems of the province of Holland in great detail, while a map of the Dollart, the estuary of the Ems, illustrates the contest of sea and land in that region. Several small maps represent conditions in the early Middle Ages in various regions of interest, and there is a valuable inset, 1:100,000, showing the present and past channels of the lower Rhine.

The only criticism to be made is that the work has not been indexed, having merely a table of contents, which, of course, is of no material aid to one wishing to consult a special point.

THEODOOR DE BOOY.

EASTON, C. **Het Dordtsche probleem (de vroegere loop der rivieren bij Dordrecht).** Maps. *Tijdschr. Kon. Nederl. Aardrijk. Genoot.,* Vol. 34, 1917, No. 1, pp. 1-37.

GALLÉ, P. H. **De storm van 13-14 Januari 1916.** Maps. *Tijdschr. Kon. Nederl. Aardrijk. Genoot.,* Vol. 33, 1916, No. 3a, pp. 351-363.

—— **Handelsbeweging, De, der buitenbezittingen in 1914. Part I: Met het Buitenland.** 41 pp. **Part II: (a) met Java; (b) met andere gewesten der buitenbezittingen; (c) Afzonderlijke beschouwing van enkele producten der buitenbezittingen.** 139 pp. *Mededeelingen van het Bur. voor de Bestuurszaken der Buitenbezittingen, bewerkt door het Encyclopædisch Bur., No. 9.* Filiaal Albrecht & Co., Weltevreden, and G. C. T. van Drop & Co., The Hague, 1915. Each Fl. 1.50. 11 x 9. [Trade with the Dutch colonies.]

—— ***Belgium.*** 1:100,000. Sheets: No. 1 A, Dunkerque; No. 2, Ghent; No. 5, Tournai (2nd edit.); No. 5 A, Hazebrouck (2nd edit.); No. 12, Valenciennes (2nd edit.).

Geographical Section, General Staff, War Office, London, 1915-16. [Sheets of a topographical map which is a product of the war. Drainage in blue, contours (interval, 10 meters) in brown, woods in green, roads in red, towns in black.]

AFRICA

General

WALKER, H. F. B. **A doctor's diary in Damaraland.** vii and 207 pp.; map, ills. Edward Arnold, London, 1917. 7s 6d. 9 x 5½.

WHITTALL, W. **With Botha and Smuts in Africa.** 279 pp.; maps, ills. Cassell & Co., Ltd., London. 6s. 8 x 5½.

YOUNG, F. B. **Marching on Tanga (With General Smuts in East Africa).** xii and 265 pp.; map, ills. W. Collins Sons & Co., Ltd., London, 1917. 6s. 8 x 5.

There is an absorbing quality in these three personal narratives: its basis lies largely in their effective portrayal of the distinctive geographical aspects of the campaigns. This is the scene of the campaign in German Southwest Africa described by Commander Whittall: "Hundreds of miles of stark desert, almost waterless and without vegetation save for occasional patches of poisonous 'milkbush' scrub; poisoned and polluted water-holes and mine-strewn tracks; scorching sun by day and frost at night; flies that were like the Egyptian plague, sand that was like marching in deep snow and, where the sand was not, rock that cut the stoutest of boots to ribbons in a week." It is an epitome of the geography of a large area of Southwest Africa.

All three writers are naturally concerned for the most part with the inimical aspects of nature. Whittall, in command of an armored-car squadron operating first in the desert sands of German Southwest and later in the equatorial sloughs of German East Africa, had a full experience of transport difficulties. His narrative shows explicitly some of the obstacles to be overcome in the opening up of Africa.

Dr. Walker's experience in the less mobile service of the field hospital was less extensive. He found leisure for observations on the natural history of his surroundings. He notes for instance the rare occurrences of the Swakop flood and a thunderstorm at the port and the curious phenomenon characterizing the coast waters during the Christmas season, when the gas-impregnated waters kill quantities of fish—each event, it may be noted, of a more than local interest, for parallel happenings take place on the analogous coast of South America. The pictures of the country seen by Dr. Walker are well worth noting; such is that of Windhuk—height encircled, its red roofs, white walls, and seven slender black towers (the noted wireless station) standing out of a landscape dappled with green thorn trees, bleached winter grass, and white sand.

The author of "Marching on Tanga" is a poet as well as a fighter. Beyond the cruelties of the struggle he feels the spell of Africa. In the dangers of the bush he sees the strange beauties around him: "And then, to my horror, the bush suddenly ended. We came without warning to one of those wondrously beautiful slades of waving grasses with which the thorn is scattered. All down the Pangani we had seen them waving their purple heads in the sun; but here the country was more parched and the waves were silver. A lovely sight, and very easy going; but to cross it would have meant certain death .... Our only chance lay in keeping to the bush around the slades of grass." And this is the bush: "Eternal thorn of mimosa and acacia, set with brushwood and spears of wild sisal below, tangled with fleshy cactus above—scattered here and there with withered candelabra trees lifting their dry arms above the thorn." There are also allusions to matters of deep human importance. The dwellers in the war-swept zones of Europe are not the only innocent sufferers. On the natives of Africa hardships have been entailed, loss of homes and resources and the stirring up of troublesome tribes. And the great movements entailed will not improbably further the spread of disease "in lands where assuredly there is enough already."

In the preparation of the article on the military campaigns against Germany's African colonies appearing in this number of the *Review* these three books were found exceedingly useful.

Sudan and Upper Guinea

CLARIDGE, W. W. **A history of the Gold Coast and Ashanti from the earliest times to the commencement of the twentieth century.** With an introduction by Hugh Clifford. **Vol. I:** xxxiii and 649 pp.; map. **Vol. II:** xv and 638 pp.; maps, bibliogr., index. John Murray, London, 1915. £1 15s. for 2 vols. 9½ x 6½.

This work is an important addition to African literature. It stands for much more than its title implies, for it gives a clear and adequate account of all the early explorations

along the African coasts; and all of them had their part in leading up to the Gold Coast enterprises. The Gold Coast for three centuries was the center of most European endeavor, good or bad, in Africa. These enterprises were the natural sequence of the life work of Prince Henry the Navigator, who sent many expeditions far down the west coast though they did not quite attain the Gold Coast. Prince Henry was preceded by other sailors also, and Dr. Claridge tells what they reported and critically examines their stories.

These early voyages also advanced the art of navigation. Prince Henry's caravels hugged the coasts, for it was not believed that any vessel could survive in the open sea, till one of his craft was blown out into the ocean and discovered the Madeira Islands, 360 miles from the African coast. Such work opened the way for Columbus' great venture. The slave trade originated along the west coast, and the author gives a connected account of the rise and progress of this infamous traffic. Thus we find in this work not only the detailed story of the Gold Coast colonies and Ashanti but also summaries of the relationship, for some centuries, between the whites and all these border lands of West Africa.

The story of the Gold Coast itself, especially during the hundred and sixty years of the Portuguese occupancy, has scarcely a redeeming feature. It was a time when greed, injustice, and brutality marked the policy of white adventurers, as is vividly set forth in this narrative. The larger part of the work is given to the rise, progress, and fall of the Ashanti nation. For two hundred years this remarkable people protected themselves against the aggression of all other Africans, but their empire crumbled completely at last, after seven wars with England between 1803 and 1900. Their military genius made them the most formidable native race in Africa; but whatever injustice may have been done them they are today more happy and prosperous than ever before, for their energies are given to the cultivation of their farms and cacao plantations and to the improvement of their towns.

Dr. Claridge's volumes show great diligence, a critical faculty, and the power of grouping facts in logical order and in proportions justified by their relative importance. It is a work that all students of Africa should read. CYRUS C. ADAMS.

REGELSPERGER, GUSTAVE. **Afrique Occidentale Française.** *Bull. Soc. de Géogr. Comm. de Paris*, Vol. 38, 1916, No. 7-9, pp. 454-455. [Abstracted in the July, 1917, *Review*, Vol. 4, p. 61. Deals with a journey by R. Chudeau in a portion of Upper Senegal opened up by the railroad connecting the upper Senegal River with the upper Niger.]

RENAUD, J. **Le port de la Côte d'Ivoire.** Maps. *La Géographie*, Vol. 31, 1916-17, No. 1, pp. 1-30. Paris.

VAN VOLLENHOVEN, J. **L'aide de l'Afrique Occidentale à la métropole.** *Renseign. Colon. (Suppl. à l'Afrique Française)*, 1917, No. 7-8, pp. 182-186.

VASCONCELLOS, E. J. DE C. E. **Archipelago de Cabo Verde: Estudo elementar de geographia phisica, economica, e politica.** 126 pp.; map, bibliogr. (Series: Colonias Portuguezas.) Centro Typographico Colonial, Lisbon, 1916. 8½ x 6.

—— **West Africa, The new coal-field in.** Map, ills. *Bull. Imperial Inst.*, Vol. 14, 1916, No. 3, pp. 369-378. [Abstracted in the May, 1917, *Review*, Vol. 3, p. 403.]

X ——. **Douala, port français.** Ills. *L'Afrique Française*, Vol. 27, 1917, No. 5-6, pp. 179-183. [Duala in the German colony of the Cameroons, conquered by the Allies in 1916.]

—— ***Africa, 1:125,000. Sheet North B-32/N-III (Kba).*** [Geogr. Section, General Staff, War Office, London.] 1st ed., rev. to 1914.

—— ***Africa, West coast of. Forcados River to Opobo River.*** 1:250,000. *U. S. Hydrogr. Office Chart No. 2352.* Washington, D. C., July, 1916.

ASIA

SIBERIA

CZAPLICKA, M. A. **My Siberian year.** xii and 315 pp.; map, ills., glossary, index. James Pott & Co., New York, [1916]. $3.00. 9 x 5½.

The author was one of a party who left England in the spring of 1914 under the auspices of Oxford University to travel in Siberia. Mr. H. U. Hall, to whom the book is dedicated, represented the University of Pennsylvania Museum on the expedition. (An article by Mr. Hall, based on the observations of the expedition, appears in this number of the *Review*.) The book contains much of interest in spite of a somewhat wandering method of presentation. There are many valuable illustrations taken from photographs,

but the map, purporting to give the route of the expedition, is of little use on account of its incompleteness. However, an ordinary atlas (or the map on p. 2 of this number) will allow the reader to follow Miss Czaplicka in her journey. The first summer was spent in the Big Low Tundra, the land of the Samoyedes, at the mouth of the Yenisei; the following winter among the Tungus near Turukhansk on the Yenisei just below the Arctic Circle; and the next summer in the Minusinsk district along the upper Yenisei south of Krasnoyarsk, a region not only picturesque and fertile but valuable both for its wealth of minerals and for the evidence of an ancient people that dwelt there in the days of the mammoth and the woolly rhinoceros. The author writes with sympathy and understanding of the people of the far north, with their childlike virtues and faults and their pitiful helplessness in the hands of the traders along the river, who, with a bottle of vodka, drive unmerciful bargains with the trappers and fishermen.

While the chief wealth of the northern peoples consists of reindeer, fish, mainly sturgeon and salmon, are of great value. In the Ob from sixteen to twenty thousand tons of fish are caught every year. On the Yenisei, where settlements are fewer and the means of transport less developed, the yield is between three and four thousand tons a year.

The working of primitive law on the tundra is shown in an account of the meeting of a native council composed of representatives of each clan. The council, which dates back to remote times, was originally a very democratic institution, but Russian influence in strengthening the power wielded by the presiding officer has made it less so. In the "Christian shamanist" is found the merging of ideas between primitive European and Asiatic minds, some superstitions of the Russian Christians being superimposed on the natives' belief in the medicine man, or shaman. The author suggests that the ideal apostle to these people would be a medical missionary to take the place of the shaman, and minister equally to body and soul. A weird and terrible tale is told of the working of the shaman's curse on an unfortunate who when drunk jibed at his pretensions.

The cunning policy of the late Russian Government in including in the same group of exiles both criminals and political offenders has had the desired effect of lessening the sympathy which the Siberian peasants formerly felt for the "politicals," a term which now by the undiscriminating has become a term of contempt.

In conclusion, the author discusses Siberia's possibilities as the Canada of the East, the home of a great self-governing people. Improvements in transportation are of great importance here, but the opening of the Kara Sea route, long closed by tariff regulations, and the extension of railways and canals are hopeful signs for the future.

R. H. JONES

CZAPLICKA, M. A. **On the track of the Tungus.** Ills. *Scottish Geogr. Mag.*, Vol. 33, 1917, No. 7, pp. 289-303.

KAMINER, A. **L'industrie de la Sibérie et la guerre.** Ills. *La Nature*, No. 2242, 1916, Sept. 16, pp. 189-192.

KRYLOV, P., AND E. STEINBERG. **Contribution à la flore du district Kansk de la province Jenisei.** *Bull. Acad. Imp. des Sci.* [*de Pétrograd*], Ser. 6, 1917, No. 1, p. 1. [In Russian.]

LAUWICK, MARCEL. **Proposed new railways in Siberia: Opening up Lena and Ob districts.** Map. *London Times Russian Section*, No. 20, 1916, May 27, p. 12. [Abstracted in the December, 1916, *Review*, Vol. 2, p. 472.]

—— **Siberia, Rapid growth of.** Map. *London Times Russian Section*, No. 23, 1916, Aug. 26, p. 6. [Abstracted in the October, 1916, *Review*, Vol. 2, p. 309.]

—— **Siberian village life.** *London Times Russian Section*, No. 23, 1916, Aug. 26, pp. 6-7. [Abstracted in the October, 1916, *Review*, Vol. 2, p. 309.]

V—, J. **Le commerce extérieur russe par Vladivostok pendant la guerre.** *La Nature*, No. 2238, 1916, August 19, pp. 119-120.

SOLEY, JOHN C. ***Coast line of Northeast Siberia, the New Siberian Islands and Kaiser Nikolas Land and Cesar-evich L. as discovered by the hydrographic expedition under Capt. Wilkizki, I. R. N., 1913.*** 1:6,000,000. U. S. Hydrogr. Office, New Orleans Branch, 1916.

—— ***Vladivostok harbor and vicinity, including the Eastern Bosporus or Hamelin Strait. (From Russian surveys between 1875 and 1896).*** 1:25,000. *U. S. Hydrogr. Office Chart No. 2071.* Washington, D. C., July, 1916.

AUSTRALASIA AND OCEANIA

Australia, New Zealand

Taylor, Griffith. **The control of settlement by humidity and temperature (with special reference to Australia and the Empire): An introduction to comparative climatology.** 32 pp.; maps, diagrs. *Commonwealth Bur. of Meteorol. Bull. No. 14.* Melbourne, 1916.

The intimate relations which exist between climate and weather on the one hand, and the health, activity, and progress of mankind on the other, have long been an interesting subject for discussion. From the days of the early Greek philosophers and geographers, such as Parmenides and Strabo, through scores of later Latin writers, down to the recent investigations of Osborne, Vincent, Lancaster, Tyler, Huntington, and others, attention has been paid to such relations. It is natural that the later work has concerned itself more and more with *quantitative* expressions, in terms of temperature, humidity, wind movement, etc., in the effort to give more exact and more practical results. The literature on this matter is growing rapidly.

Dr. Taylor's memoir is one of the most noteworthy discussions which have yet appeared and, although already referred to in these pages (*Geogr. Rev.*, Nov., 1917, Vol. 4, pp. 401-403), merits a more extended notice. Essentially, it deals with the elements of relative humidity and temperature in their relation to the development of the white races and considers the difficulties in connection with the settlement of tropical lands, especially Northern Australia, by white men. The object in view is to determine broadly the *limits of comfortable settlement.*

Parts II and III of the memoir concern the mean annual range of temperature and the mean monthly relative humidity of Australia. Part IV deals with the "climograph" and its value in climatology. The climograph is "a graph in which the twelve monthly mean values of wet-bulb temperatures and relative humidity at a given place are plotted as a twelve-sided polygon, with wet-bulb ordinates and humidity abscissae" (see Fig. 1 in the *Review, loc. cit.*, p. 402). The climographs for twelve important centers of Anglo-Saxon settlement were averaged, and this average, or *type white climograph*, is used as a standard in all the other climographic charts. It ranges between the following limits: summer, wet-bulb, 62° F., humidity, 68.5 per cent; winter, wet-bulb, 37° F., humidity, 81 per cent. These results are, in general, similar to those reached by Huntington in his work. Specimens for typical climates illustrate the value of the climograph in any studies of climate in relation to settlement by white men. A tentative "scale of discomfort" is suggested. I, the *most comfortable*, has a mean monthly wet-bulb range of 45°-55° F. and approximately no uncomfortable days per month. VI, *continuously uncomfortable*, has an average monthly range of wet-bulb readings over 75° F. Such a scale suggests the late Professor Abbe's "curve of comfort" and Tyler's scale of "hyther." The last section of the memoir gives examples of climographs for the major natural regions suggested by the late Professor A. J. Herbertson. These diagrams show how neighboring localities differ *inter se*, how closely their climates resemble those of distant "homoclines", and how each differs from the *type white climograph.*

The author clearly emphasizes what he considers the most important feature of the memoir: it is the comparison which is here made between the various English colonies with reference to their availability for successful settlement by English people. The memoir was written in an attempt "to give a scientific basis to the climatic aspect of Empire-building and Empire-welding." The patriotic motive was obviously a very strong one.

Dr. Taylor's monograph is an extremely interesting and suggestive discussion of a very important subject. It merits careful study. A mere glance through its pages will not suffice for those who are working on the larger human relations of climate. The immediate practical application of the facts here set forth to the national problems of geographic rearrangements and of new settlements which will follow the war is obvious. The memoir distinctly deals with practical economic and political climatology.

R. DeC. Ward.

Basedow, Herbert. **Physical geography and geology of the Western Rivers' District, Northern Territory of Australia.** Map, diagrs., ills., bibliogr. *Proc. Roy. Geogr. Soc. of Australasia, South Australian Branch: Session 1914-15*, Vol. 16, pp. 147-217. Adelaide, 1916. [Notes made by the author in the field, 1905. A geological map accompanies the article.]

Best, Elsdon. **Maori and Maruiwi: Notes on the original inhabitants of New Zealand and their culture; on the question of how that culture affected the later-coming Maori; and on the existence in these isles of customs, arts, and artifacts**

not traceable to Polynesia. *Trans. and Proc. New Zealand Inst.*, Vol. 48, 1915, pp. 435-447. Wellington, 1916.

BEST, ELSDON. **Maori storehouses and kindred structures, houses, platforms, racks, and pits used for storing food, etc.** Preface by J. A. Thomson. viii and 107 pp.; ills., bibliogr., index. *Dominion Museum Bull. No. 5.* Wellington, 1916.

BEST, ELSDON. **Maori voyagers and their vessels: How the Maori explored the Pacific Ocean and laid down the sea roads for all time.** Glossary. *Trans. and Proc. New Zealand Inst.*, Vol. 48, 1915, pp. 447-463. Wellington, 1916. [The vessels of the voyagers; the discovery of New Zealand; the peopling of the Pacific.]

EDUCATIONAL GEOGRAPHY

GOODE, J. P. ***Physical and Political Wall Map Series.*** [18 maps, each of the 9 areas being represented by a physical and a political map:] (1-2) ***North America.*** 1:6,167,209 (*sic*). (3-4) ***United States.*** 1:3,015,936 (*sic*). (5-6) ***South America.*** 1:6,167,209 (*sic*). (7-8) ***Europe.*** 1:4,500,000. (9 10) ***Africa.*** 1:7,793,280 (*sic*). (11 12) ***Eurasia.*** 1:9,376,330 (*sic*). (13-14) ***Australia and the Philippines.*** 1:5,702,400 (*sic*). (15-16) ***The World*** (in Mercator's Projection). Equatorial scale, 1:26,294,400 (*sic*). (17-18) ***The World in Hemispheres.*** 1:26,000,000. With two insets, 1:75,000,000: (a) Natural Vegetation and Ocean Currents; (b) Mean Annual Rainfall and Prevailing Winds. Rand, McNally & Co., Chicago, 1913-17. Price, $7.50 each, or more according to style of mounting.

As the first modern geographical wall maps of American manufacture, this series, now completed, deserves special attention. It represents a fundamental step in the right direction and fulfills a really important mission. In the physical set of the series American teachers for the first time have at their disposal adequate physical maps of the continents made for their own use. The fact that in planning this undertaking it was decided to make one of the sets physical is evidence of the author's recognition that the fundamental geographical map is the one showing relief.

Relief is shown by the usual tints varying, for the land, from green through yellow to brown, supplemented by hachuring, and, for the ocean, from white through light blue to dark blue. The land tints are separated by the contours of 0, 1,000, 2,000, 5,000, and 10,000 feet (100- and 500-foot contours are added on the United States map, the former not as a tint boundary; and the 5,000-foot is contour omitted from the world map) and the water tints by the isobaths of 0, 500, 5,000, 10,000, 15,000, and 20,000 feet (15,000-foot isobath omitted from the world map). This selection does not seem entirely fortunate. On land it omits the critical 600-foot contour, which broadly divides the lowlands from the highlands the world over—those lowlands which constitute one-third of the land surface of the globe and on which lives the greater part of human kind. In the highest elevations the subdivisions seem somewhat minute. Only one-tenth of the land surface lies at an altitude greater than 6,000 feet; and yet two tints are used for elevations above this level. Similarly it seems unnecessary to indicate by two tints the abyssal depths (below 16,000 or 18,000 feet), as they constitute a single broad division of submarine relief; one tint would have sufficed for this category (accounting, as it does, for only 1.4 per cent of the ocean floor) without impairing the effective representation of the characteristic troughs of the western Pacific. A scheme of vertical subdivision made up of more critical values might possibly read as follows: 6,000, 4,500, 3,000, 1,200, 600, 0, —600, —6,000, —12,000, and —18,000 feet. Through the introduction of the 600-foot contour the unnatural island-like appearance of certain highlands might have been avoided, which here seem to rise abruptly from the surrounding lowlands, an effect heightened by the sharp contrast between the green and the yellow tint used. This is notably the case with the Appalachians, as was pointed out in a previous review of the North American map in the series (*Bull. Amer. Geogr. Soc.*, Vol. 46, 1914, pp. 715-717), a defect which the addition of the 500-foot contour on the United States map has noticeably remedied. The Brazilian Highlands suffer from the same treatment: this omission creates the impression that the lowlands of the Paraguay and of the Madeira are continuous, as it suppresses the meeting tongues of upland connecting the Bolivian plateau and the Matto Grosso highland.

Ocean depths are not always represented in the same way for identical regions. While the Liukiu, Philippine, and Sunda Troughs appear on the maps of Australasia and the world, they do not appear on the map of Eurasia, dated 1914, although complete information has been available since the publication in 1909 of the results of the *Planet* expedition.

In addition to hypsometry and bathymetry the maps of the physical set show warm

and cold ocean currents and January and July isotherms. The isotherm interval used, 10° C., or 18° F., is somewhat too large to bring out more than the most general climatic elements. A misconception, on the map of North America, of the temperature conditions over Greenland has been corrected on the map of the world.

The maps of the political set show, besides the political units and their subdivisions, cities (also on physical set), the main steamship lines (with distance in nautical miles), ocean cables, and railroads, distinction being made between the more important and the less important lines. The political units are very effectively brought out by marginal coloring. The cities are classified according to their size, the two largest classes on each map being made prominent by a red symbol and large lettering. On the map of Africa it may be the occasion of surprise to some to find the generally unknown towns of Abeokuta, Ibadan, and Ilorin ranked with Cape Town in size (100,000-200,000 class). And yet these three native towns are the expression of Africa's largest densely populated area, Nigeria. (However, a recent authority—Herbertson in "The Oxford Survey of the British Empire," Vol. 3, gazetteer—credits Abeokuta with only 60,000 and Ilorin with 70,000 inhabitants). The criterion used to distinguish the main trunk lines from the secondary railroads, as defined in the legend, does not seem fortunate. Except for the maps of Europe and Eurasia, main lines are considered to be those which connect cities of a certain rank, such as those of 200,000 inhabitants or over. For South America this leads to treating the Buenos Aires-Tucumán-La Quiaca line as secondary, except for the stretch Buenos Aires-Rosario. Even with the less arbitrary division on the map of Europe such important trunk lines as the Italian east-coast line to Brindisi and the Budapest-Iron Gates-Bukharest line are shown as secondary and the outlet of the latter to Constantza is not indicated at all.

Viewed broadly as to their general treatment both sets, the physical and the political, are very satisfactory. The requirements of a wall map, presentation of essentials only and effectiveness at a distance, have, on the whole, been well met. The altitude tints are very telling, and the coast line and the rivers are in general treated in the bold manner necessary for legibility at a distance. (Some rivers are shown in hair line: it would seem better to omit them altogether or, if considered essential, to weight them equally with the others.) The treatment of steamship routes is less in keeping with these principles: not only are they represented by lines so thin that, when single, they are not visible at a distance, but there is also a tendency to show individual lines rather than trade routes, so that, between Hongkong and Singapore, for instance, four or five thin parallel lines are used instead of the generalized line that sound pedagogy and cartography require. On the other hand, educational principles are observed in the arrangement of the maps as to the area covered. Eurasia is the title and the content of the sheet designed for Asia; and the inclusion of the whole Mediterranean, with its African shore, on the map of Europe and of the coast of Brazil on the map of Africa is evidence of the desire to bring out broader relationships.

In the matter of scale, however, the absurdity of citing the natural scale to the nearest unit (or ten or hundred or thousand, for that matter, on small-scale maps) has evidently not been realized since attention was called to it in the previous review mentioned. The underlying conception would almost seem to be that the question of scale is fortuitous and not in the control of the compiler. And yet the matter is very simple. A definite scale, suitable to the desired detail and the size of the map, is decided on beforehand, preferably one in round numbers, as 1:6,000,000 or 100 miles to the inch, and the map is then drawn with a view to reproduction on, or reduction to, that scale. If a miles-to-the-inch scale is used as the basis and it is desired to add the equivalent natural scale, this should be done exactly, in multiples of 63,360, a principle which is violated on all the maps except those of Australia and the United States (e. g. North America and South America, "1:6,167,209, or 97 miles = 1 in."). If the natural scale is the basis, this should always be given rounded off to at least one per cent of the denominator (e. g. to the nearest ten thousand in millionth scales) as any greater nicety is rendered futile by the limitations of printing and the liability of paper to shrinkage.

But these imperfections should not obscure the larger value of the series. To accustom our teachers to the use of the physical map is no unimportant mission. That custom once firmly established, we can then proceed to the wider field of mapping, as Unstead and Taylor have done in England, the gamut of geographical phenomena for each region or—a specifically American undertaking—of representing on a larger scale the individual sections of our country.